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TO STIMULATE PUBLIC INTEREST IN NATURE
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OCTOBER · 1934

SOME AUTUMNAL MYTHS
Charles Fitzhugh Talman

HEREDITARY WARS OF THE ANTS
S. F. Aaron

THE LIFE OF A TRAP-DOOR SPIDER
Lee Passmore and F. E. Beck

THE WHY OF AUTUMN COLOR
Carol H. Woodward

ANDROMEDA AND PEGASUS
Isabel M. Lewis

GROWING LILIES
Allen H. Woods, Jr.

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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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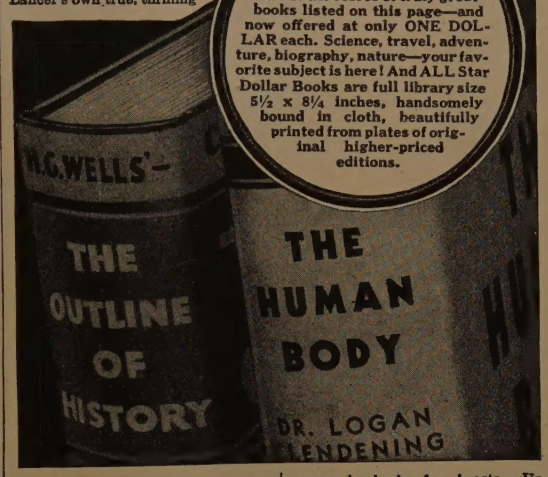

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PHOTOGRAPHING FLOWERS

By Raymond A. Wohlrabe

Nature does a wonderful job of fashioning flowers to brighten hillsides and valleys and garden plots in the warm months of the year and we, hoping to preserve them, have tried modeling, drying, preserving them in various chemicals, and photographing them. Out of all the methods developed so far I doubt whether any is quite so successful as photography.

The average amateur photographer is restricted to making reproductions in black and white. But he is not unduly handicapped because of this. Most of us will agree that photographs in black and white are superior to photographs in natural colors in bringing out texture and delicate variations in illumination and in yielding truly artistic results.

The work of photographing flowers might seem a little bit difficult to the beginner. Those difficulties are much like the difficulties encountered in portrait photography. Background, lighting, and the sensitivity of the film to colors become in this field factors equal in importance to exposure and the size of the diaphragm opening. In addition to good sharply focused detail, usually desirable in all types of photographs, in flower pictures there are other things, too.

If, after making certain the camera is set for the right exposure, you have taken the proper precautions necessary to show slight variations in color, delicate shadings due to the texture of the petals and that slight glistening that comes from light reflected from flower secretions, then you can look for good results in your pictures. They will be pictures above the ordinary. They will be more than just a photographic record. A fairly fast film should be used, not just the ordinary film. Panchromatic film is good but it is often a little difficult to handle if you have not been in the habit of making exposures with it. But through the use of panchromatic film true color value may be recorded. The extra experimenting that might be required when first working with panchromatic film is often well rewarded by the better, more perfect pictures it makes possible. All of the illustrations accompanying this article, however, are from photographs made on verichrome film.

Very delicate shadows due to the natural depressions in a petal give the reproduction of it in the photographic print plumpness—make it stand out as though embossed. There are two helps in producing this quality in the flower pictures you take. One is to use a small stop and a rapid shutter speed—the other is side-lighting. Just suppose you are photographing a cluster of white blossoms. If a long exposure is made, the parts of the petals lightly shaded will have an opportunity to register on the film. The result? All semblance of shadow is gone. The petals are a chalky, lifeless white. If the picture is taken by making a short exposure, the parts of the petals overcast by thin shadows have no time to affect the film and the shadows show in the finished picture. The small stop, of course, by regulating the amount of light passing through the lens of the camera works hand in hand with the speed of the shutter. For flower photographs taken out-of-doors a stop of between f 5.6 and f 4 and a speed of about one one hundred and fiftieth of a second are usually satisfactory. Changes in lighting and in the kind of film used will have to be accompanied by changes in both stop and speed.

In flower photographs, as in all close-ups, it is a good idea to be careful about using a very large stop even though the day might be a cloudy one. A far better way to increase the exposure is to use a slower shutter speed. You have seen photographs in which there is no great depth of focus—th distance between the objects in the for ground of the picture which are in focu and those in the background also in focu is not very great. The lens of the camer used in taking such a picture must have bee an anastigmat lens and the cause of the sha low depth of focus was that too large stop was used. That is how pictures take with an anastigmat lens using a large sto are affected. If the other type of lens—th rapid rectilinear—had been used under th same circumstances, the depth of focus woul not have been altered much but the image of the objects near the margins of the pi ture would have been fuzzy, blurred. S if more light must be given the film i taking the picture, it is best to do it b slowing up the speed of the shutter an leaving the stop small.

Background has a big rôle in making su cessful flower pictures. It is intended, c course, that the flower itself should attrac the eye of one who is looking at the pi ture more than any other thing in it. The everything else must be pushed out of th limelight. The blurring of leaves and stem which naturally results from focusing o the flower or flower cluster does this quit well. But some consideration must be give to this phase of the job in the preparation to be made before the picture is actuall taken. If it is a cluster of flowers such as clump of violets, carefully trim away a the nearby plants that might be sharp focused along with the violets. If the pi ture is to be one of a sprig of blossoms some shrub or tree, it is well to tie it such a position as to prevent any oth branches or sprigs from being near it. The set the shutter speed, focus carefully on th flowers themselves, stop down the lens the desired stop and the picture is ready be taken.

A word about highlights might not

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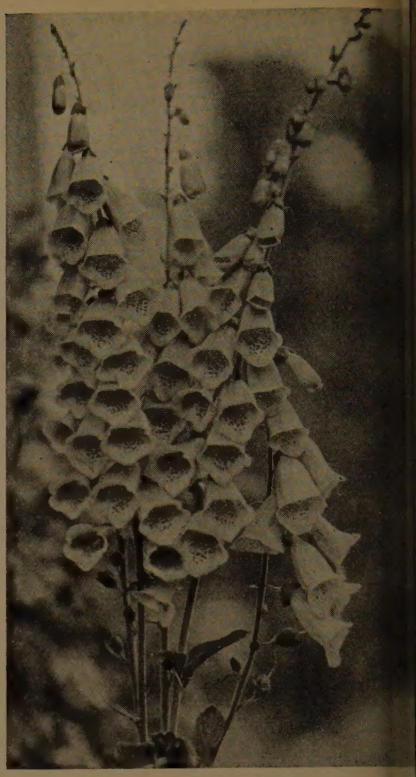

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amiss here. Highlights are the bright parts of the picture—white objects, bits of sky and similar things. You have probably noticed in photographing the blossomed tips of twigs that the images of the leaves of other twigs which are very close and of the spaces showing the sky tend to form many light and dark discs. The background becomes mottled because of them. The white discs of light become the strongest highlights of the picture in many instances. Such a mottled background becomes confusing. It cannot always be gotten away from—but a good attempt to get away from it should be made. A background built of overlapping circles of white interspersed with black is not going to add to the attractiveness of the finished picture. If a branch can be bent so that the sky or some evenly colored object shows behind it, so much the better. A very attractive type of background is one which is dark at one side or in one corner and gradually, not necessarily uniformly, fades into white on the opposite side or corner. Shifting the position of the camera before taking the photograph will often lead to the discovery of a background such as this.

Some flowers are more difficult to photograph than others. It is far more encouraging for the beginner to work with flower subjects easy to photograph first. Then handling the more difficult subjects will be less of a problem.

The forms of some flowers make it no easy matter to arrange them so that the picture will have good composition. Flowers that grow in tufts or spikes can be shifted around to form artistic groupings most easily. They are the best material for the beginner to work with. The tall stems with their blossom clusters or whorls can be shot at from many different angles until one exceptionally good has been discovered.

Color is sometimes an obstacle, too. Most films are less sensitive to red light than they should be. Objects colored red appear to be black or gray in the finished photograph. Unless color filters and panchromatic films are used such flowers as red roses, red sweet peas or any deep red flowers will be disappointing subjects with which to work. It is better to select blossoms blue or white or purple in color. Yellow also, especially with ordinary film, photographs too dark. When first working in this field of amateur photography a selection of the right colors in your subjects is important.

Flower photography is an interesting field. It offers no very great difficulties. On the other hand there are many opportunities to produce some very excellent pieces of work. Beautiful photographs are sure to be obtained—beautiful not only because of the beauty fashioned from waxy or velvety petals but also because of the valuable detailed records they become of some of Nature's creations.

Outdoor Poems

Some time ago we had the pleasure of reviewing *Bird Songs and Songs of the Open*, by Bert Dayton. The book has been well received by bird and Nature lovers generally, and has enjoyed considerable school use. In view of this, the publishers advise us, it is now possible to reduce the price of the book and thus give it wider circulation. For the balance of this year this book will sell for one dollar. The publishers are the Palisade Press, 125 Church Street, New York City.

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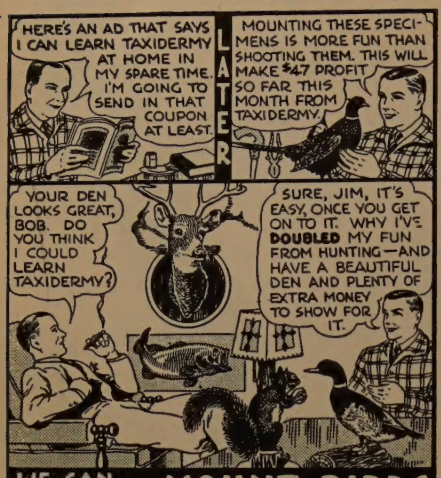
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Mrs. Munger Retires

After twenty-one years of continuous service as president of the Michigan Audubon Society, during which period she has been instrumental in building it to an influential, state-wide organization, Mrs. Edith C. Munger of Hart, Michigan, has retired from the active routine responsibilities of the office. She is succeeded by Frank L. DuMond of the Kent Scientific Museum at Grand Rapids. In the last issue of *Jack-Pine Warbler,* bulletin of the Society, Swift Lathers renders the following tribute to Mrs. Munger:

So different was she from those
Who tramp the paths so listlessly,
Oblivious of songs that fall
On unattentioned ears;
Unmindful of a thousand notes diversified
That fling from a thousand feathered throats
Each vesper chorus, each matin call
That sweetly floods in ecstasy—
She loved them all.

I saw her pass in lavender and lace
Along a path unfrequented, beside the marsh,
A hemlock marked the place
Where she would wait the bittern's harsh
And blatant noise. Sweet sounds to her who
loved the wild,
Whose lonely footprints on the sands
Along the desolate winding shore
Were glad with wind and sky and gulls.

In woods where gentians held their bottled
heads,
Secluded spots where orchids grew,
She prayed that careless, pestilent hands
Might never come. When sunrise broke
She went afield to daisies and the larks.

I think I know her church, her choir,
The great cathedral of the woods;
She treads its aisles with reverent feet
And drinks each day its music sweet.
She may not say a mass in words
But in her heart's an altar fire
That flames unceasingly to birds.

And if her soul could choose its flight
In the transmigration of the night,
When living things must go to dust
And reincarnate be,
I'm sure she would be born a tree
And stretch her arms for birds to rest,
To sing their songs and build their nests,
And soaring wings in covering skies
Would sing to her, her paradise.

Films on Wildlife

Two new sound pictures on the preservation of wildlife, combining scenic beauty with interesting and unusual shots of wild game mammals and birds, have just been released by the U. S. Department of Agriculture. They are:

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A CLOSED SEASON NEEDED, BUT—

American Waterfowl Face Their Most Serious Crisis

"IF we did what was best for the waterfowl we would declare a closed season," declared Jay N. Darling, Chief of the United States Bureau of Biological Survey, to a group witnessing an exposition of the waterfowl situation in the breeding areas this year. Then he added, "But—".

Other speakers summarized the results of authentic and comprehensive investigations. They presented conclusive and alarming evidence of added decimation by drought. They proved that there is ample breeding ground left, but proportionately few birds breeding. They declared that our migratory waterfowl are facing a dangerous crisis. Then they added, "But—".

How many tragedies lie behind that one little word? How often has that phrase, "It should be done, but—", been heard? And here we find it again when the future is black for several species of our migratory waterfowl. Determined that a fight must be made in behalf of these birds, Mr. Darling, immediately upon taking over his responsibilities, set out to find facts. There was a shooting season to come. The Biological Survey must make recommendations on shooting regulations for the consideration of the Advisory Board under the Migratory Bird Treaty Act. During the shooting season of 1933-34 field men had studied conditions and the effects of such reprehensible practices as baiting, use of live decoys, rest days, the battery, sink boxes and the repeating gun. Later, on the eve of the meeting of the Advisory Board, trained biologists were in the breeding areas sending in reports of fewer breeding birds than ever.

Mr. Darling was faced with a problem. He knew that an absolutely closed season was what should be declared. He knew that all the instruments of wholesale killing, from baiting to the repeating gun, should be outlawed. At the same time he realized from sad experience the strength of the shock troops of the organized hunting and ammunition interests. He had led a fight against baiting even to the White House, and had met and been defeated by the picked minions of superior organization. He knew he could not get what was best for the birds. Compromise, he felt, was the only course, and so the Advisory Board was asked for a thirty-day open season, the States having the option of extending the period over as many as fifteen weeks, with rest days. This course Mr. Darling defends on the ground that fewer birds will be taken, despite the false safety of rest days, than if the season were forty-five or sixty days. The Advisory Board approved the Survey's recommendation.

In the proposals to the Board, however, there was no demand for the elimination of baiting; rather, it was recommended that baiting be continued under a system of permits. Yet the Bureau presented the Board a summary of reports from its field men on baiting and other gunning practices. In that summary such unequivocal and thought-provoking statements were made as:

"Baiting was employed in only a comparatively few local areas until after the close of the World War. The custom is spreading rapidly because in most areas it is found to give the gunner practicing it a tremendous advantage over those who do not; therefore when one hunter starts using it, others shooting in the same area feel more or less compelled to follow.

"Baiting, in the strict sense, was not developed through any altruistic spirit to help waterfowl; it was developed and is now practiced for one reason only—to facilitate the killing of birds."

This is a definite enough statement. It is utterly true and gives the lie to those hunters practicing baiting who claim that they are serving conservation by feeding the waterfowl. No more specious statement was ever made.

Further light is shed upon gunning practices in the statement that "a serious objection to baiting, with other methods used in modern gunning, is the combination of several devices and practices which in the aggregate are capable of tremendous abuse. The battery, sink box, decoys, scull boat and repeating gun all become more deadly when used with bait. Because birds often arrive at the baited blind in flocks, more cripples are produced, yet if the hunter would aim at individual birds fewer cripples should result because the bait usually brings them closer to the gunner." And concerning rest days: "Rest days are considered a necessity wherever gunning is carried on intensively and the practice is adopted equally by commercial gunners and clubs. Without them many clubs could not continue to get a satisfactory kill. The custom was not developed as a conservation measure, but as a practical means of increasing the kill, and the fewer the birds in an area, the more rest days are required."

These and other indictments are returned in this survey of the situation. The evidence is such that a prohibition of shooting over baited waters should be invoked immediately. The time has come for all decent men in the ranks of the sportsmen—and they are not few—to join with sincere conservationists in a demand that baiting be outlawed. The political expediency of the shooting-season compromise may perhaps be admitted, but the inclusion of a rest-day provision in this compromise is deplorable at this critical time, and the attitude of Mr. Darling and other informed conservationists toward baiting and other fatal gunning practices should be upheld by all who have an intelligent interest, whether sporting or esthetic, in the future of American waterfowl.

Mr. Darling should not have to make humiliating compromises in the face of facts. After presenting such an array of evidence in behalf of the birds he should not have to say the tragic words, "It should be done, but. . . ."

FLORIDA DUCKS

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NATURE MAGAZINE
VOLUME 24 · OCTOBER · 1934 · NUMBER 4

LE BRUN'S "AUTUMN"

Myths of the Waning Year

Many things they tell you about autumn have no basis in fact

By CHARLES FITZHUGH TALMAN

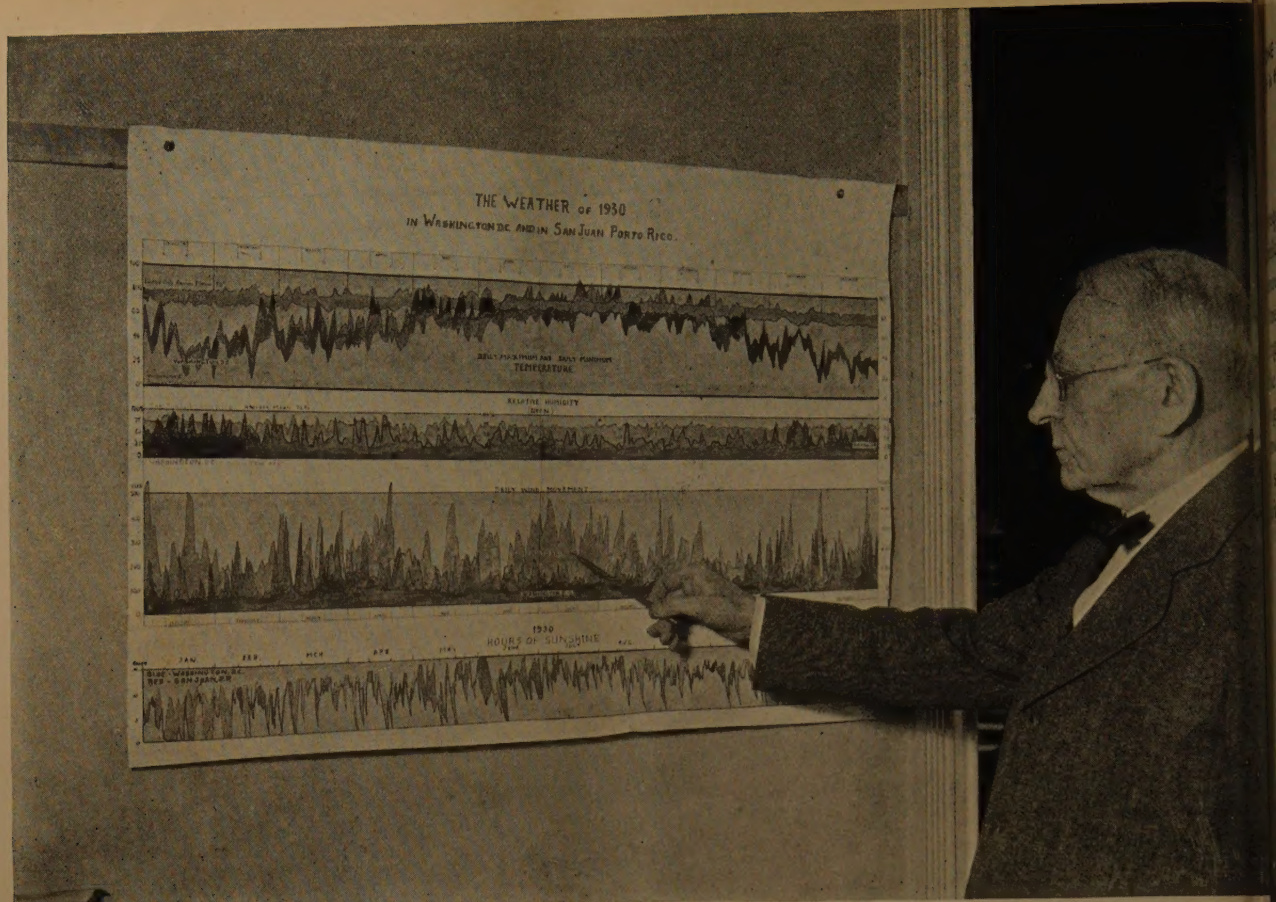
WHAT "everybody" says—about a good many things besides weather—is not necessarily so. You remember how Charles Lamb, in his *Essays of Elia,* argues away a number of beliefs so widely entertained that they have become proverbial. Men of science devote much zeal to similar demonstrations. The task is discouraging, because popular fallacies seem, like the giant Antaeus, to rise with renewed strength every time they are overthrown; but it is doubtful whether any of them are really immortal. Once everybody believed in witches. Today the belief survives only in the most backward communities.

So it may not be an excess of optimism to look forward to a time when the average educated American will be wiser than Longfellow was concerning certain traditional happenings of the autumnal season. Longfellow was a man of parts and a Harvard professor, yet he wrote in all seriousness about the mythical "storm-wind of the equinox." He took the reality of Indian summer for granted when he introduced it into *Evangeline* under the name of the "summer of All Saints." And, lastly, he did not suspect that he was helping perpetuate a bundle of foolish superstitions when, in the same poem, he said:

"All the signs foretold a winter long and inclement;
Bees, with prophetic instinct of want, had hoarded their honey
Till the hives overflowed; and the Indian hunters asserted
Cold would the winter be, for thick was the fur of the foxes."

Poetic license does not explain these allusions. Longfellow undoubtedly believed, as a majority of other long, short and middle-sized fellows did and do, in the equinoctial storm, in Indian summer as a definite event of the calendar, and in the possibility of predicting the character of a coming winter from various biological manifestations of the autumn. Let us see how these notions compare with the facts.

The equinoxes are the times, in spring and fall, when the sun in his apparent journey among the stars crosses the celestial equator. The dates of these passages vary



PHOTOGRAPH FROM U. S. DEPT. OF AGRICULTURE

PUZZLE—FIND INDIAN SUMMER

Each year's weather program in the temperate zone is a series of ups and downs—warm spells alternating with cold and wet with dry—but the program of one year is never exactly like that of another

slightly from year to year, on account of defects in our calendar. The autumnal equinox falls on or about the 23rd of September. According to our American tradition the equinoctial storm is due about this time, but not necessarily on this very day. A spell of bad weather occurring within a week or so before or after the date in question is likely to be regarded as the "equinoctial"; also known as the "line storm," because of its association with the sun's crossing of the "line". Not only are popular ideas elastic about the date of this storm, but there is also much uncertainty as to whether it is a windstorm or a long, soaking rain, or both.

The tradition was reasonable enough before there was any science of meteorology, and especially before meteorologists had begun to draw daily weather maps, from which it is possible to see just where and to what extent stormy weather prevails at any particular time. It originated ages ago in the Old World, where the equinoxes of both spring and autumn were believed to be stormy—not in any particular place, but everywhere—because it was assumed that the sun's passage over the equator must have a generally disturbing effect on the weather.

Our modern weather maps, such as are published every day by the Weather Bureau, show that universal storminess never happens. Examine one of them for an equinoctial date—or for any other day of the year—and you will find several regions where stormy weather prevails, but always a much larger total area without such weather. Despite this fact, the tradition of the equinoctial storm might still hold good in certain localities if the storms that, as I have stated, always occur somewhere on the equinoctial dates were usually found in the same places on these dates; but this is not the case. Finally, the tradition would have something substantial back of it if statistics showed that, on an average for the world as a whole, storms are more prevalent about the times of the equinoxes than at other periods of the year; but they don't!

In the northeastern part of the United States, and especially in New England, certain weather developments typical of the early autumn help to keep this tradition alive. During the warmer months, in that region, most of the strong winds and hard rains come in the form of brief thunderstorms and squalls, but a change comes in the fall. Because of the southward shift of the main storm tracks crossing the continent, the spells of bad weather then begin to be of longer duration, because they are due to the passage of widespread storms. They often begin with protracted rains and end with persistent high northwesterly winds. The first of these cold-season tempests frequently occurs near enough to the equinox to be popularly identified as the "equinoctial".

In some cases the storm thus identified is the "tail-end" of a West Indian hurricane. A good many storms of tropical origin wander up our Atlantic seaboard, and September is the month when such tempests are most

NE OF THE THINGS THEY TELL YOU IN AUTUMN
is that the hornets build their nests high before a hard winter and low before a mild one—or is it just the other way around?

●

equent. Along their tracks in this country they always eld heavy rain and their winds sometimes remain violent ough to be destructive long after they leave the tropics. ne of the most memorable storms in the history of New ngland arrived there from the West Indies exactly on e date of the equinox in the year 1815. Besides wreck- g thousands of buildings and taking vast toll of woods d forests, it carried off a pair of breeches belonging to six-year-old boy named Oliver Wendell Holmes, as he terward related in his poem, "The September Gale":

"It chanced to be our washing day,
And all our things were drying;
The storm came roaring through the lines,
And set them all a-flying;
I saw the shirts and petticoats
Go riding off like witches;
I lost, ah! bitterly I wept—
I lost my Sunday breeches."

New Englanders doubtless regarded this storm as the equinoctial"; but as nothing was known at that period out the travels of storms, nobody realized that it had iginated far off in the heart of the torrid zone perhaps couple of weeks before the equinox and that it might ntinue to travel over the globe for a week or two after aving New England.

If we define the "equinoctial storm" as any spell of ormy weather occurring anywhere about the date of the quinox, then this traditional storm is a fact, but no more f a fact than the "Fourth of July storm," or the "Labor ay storm," or the storm of any other date in the calen- ar. Otherwise it is a myth.

Indian summer is another myth; though Indian sum- ner *weather* is not. The type of weather associated in eople's minds with this traditional season is a real and riking feature of our American autumns, and it is per-

haps the loveliest weather to be found anywhere on earth. The days are sunny and warm for the time of year, but not too warm for vigorous outdoor exercise. The air is calm, or gentle breezes blow from a southerly quarter. The landscape is veiled in a soft haze, and a smell of smoke and leaf-dust pervades the air. It is poetical weather, in which the aspect of the "happy autumn fields" evokes not only memories of the days that are no more, but also impressions that seem like memories of those that never were!

Such weather is an undeniable fact, but the common belief that just one spell of it occurs every autumn is a delusion. Some years we have little or none of this wonderful Indian summer weather, while in other years it occurs at intervals through the autumn and even in the early winter. The idea is, however, so firmly fixed in people's minds that Indian summer is a single definite event in Nature's program that when two or more spells of this weather occur in the same autumn you often hear discussions over the question of which one is the "true" Indian summer. A familiar criterion for settling this question is furnished by the belief that a mild autumnal period is not really Indian summer unless it is immedi-

●

THE ACME OF FOOLISH WEATHER-LORE

"If the November goosebone be thick
So will the winter weather be;
If the November goosebone be thin,
So will the winter weather be."

ately preceded by a brief "squaw winter", with cold, gray skies and snow flurries.

The name "Indian summer" originated in America in the latter part of the eighteenth century, and it has spread in comparatively recent times to other parts of the world. Its early history is shrouded in obscurity, and the authorities have not yet been able to decide how the word "Indian" came to be used in connection with a period of mild weather in autumn; whether it was because this period was a favorite hunting season with the redskins, or a time propitious for their attacks on the whites, or the season when Indian corn was harvested; or whether it was because the smoke in the air during Indian summer was caused by fires set by the Indians, or because the pleasant weather, which was likely to change without warning, was regarded as sharing the Indians' proverbial characteristics of treachery and deceitfulness. There are still other suggested explanations.

THE GRAY SQUIRREL
The size of whose winter hoard is NOT a trustworthy sign of the kind of winter we are going to have

On the other hand, the belief that a second "summer" always occurs in the autumn is one that prevailed in Europe long before Indian summer was ever heard of, and it is probable that our North American ideas on this subject, like our ideas about the equinoctial storm, are based on the traditions of the Old World. European notions concerning this supposed renewal of summer warmth in the autumn differ in one respect from the ideas prevailing in America. Instead of being, as with us, supposed to come at different times in different years, it is generally said to occur at a particular time each year, though ideas about the date of its occurrence vary from one part of Europe to another. Some of the numerous European names applied to the traditional warm spell refer to the dates of its supposed arrival. Thus "St. Martin's summer," the commonest name for it in central and southern Europe, implies that it comes about St. Martin's Day (November 11); "St. Luke's little summer," a name common in England, that it is due about St. Luke's Day (October 18); and "St. Michael's summer," one of its names in Germany, that it arrives about St. Michael's Day (September 29).

Weather records fail to establish the reality of any of these traditional "summers" as regularly recurrent events of the autumnal calendar, though of course spells of mild and tranquil weather are likely to occur from time to time during any autumn, both in Europe and America.

November is the month when, in roaming the countryside, you will glean from rustic sages a great deal of entertaining, conflicting and worthless information about the character of the coming winter. There is a long list of time-honored portents—all perfectly unreliable—from which the prophets draw their conclusions on this subject, including the thickness of corn husks, onion skins and animals' fur, the height of hornets' nests above the ground, the dates when migratory birds take flight and beavers build their homes, the amount of food stored by squirrels, the coloration of caterpillars and, above all, the appearance of the breastbone salvaged from the Thanksgiving feast of roast goose:

"If the November goosebone be thick
So will the winter weather be;
If the November goosebone be thin
So will the winter weather be."

Besides the forecasts of winter weather actually made from such indications by farmers, hunters and others, a good many are concocted every year by newspaper correspondents and put into the mouths of purely imaginary rural oracles. The most remarkable exploits of this sort of which I have ever heard were those performed for a number of years by a talented Munchausen at Reading, Pennsylvania, who invented a whole flock of Pennsylvania-German weather prophets and regaled the country with their fictitious utterances through the columns of New York and Philadelphia newspapers. These seers were said to hold a convention every autumn, at which they decided by a two-thirds vote what kind of winter was on its way!

These autumnal fabrications of the newspapers, like their annual blather in February about the groundhog and in July about St. Swithin, are one of the routine jokes of American journalism, but it is to be feared that they are taken seriously by a goodly percentage of readers. The tales that once emanated from Reading, though they were gorgeously amusing, were stopped at the request of the Weather Bureau, because they tended to discredit the serious business of weather prediction.

Scientific demonstration hardly seems to be necessary to prove that animals and plants, though they are much affected by the weather of the past, cannot be influenced in any way by that of the distant future. If millions of people nowadays believe—or do not positively disbelieve—that various manifestations of the organic world afford clues to the weather of a coming season, it is merely because the belief has been handed down from an age when it was entirely logical and was accepted by the wisest philosophers.

It was logical because it was consistent with the idea, which no science had yet arisen to refute, that future events of all kinds affecting the welfare of mankind were announced by omens, placed before men's eyes through divine intervention rather than through the operation of natural law. No physical relation was assumed between an omen and the event it was supposed to portend

THE BATTLEFIELD WHERE ANT MEETS ANT IN FATAL CONFLICT

Fighting and dead red ants in a war to a fatal finish after a raid on the black ants. The ant in the foreground is about five times natural size

HEREDITARY WARS

Feuds in the ant world defy pacifist propaganda

By S. F. AARON

TODAY we are laboring to outlaw war; to make it unpopular and unprofitable in the civilized world of man. All who care for the future of humanity hope for the success of such a move. But for all the education in peace and its pursuits, there seems but little hope of extending it to the world of the wild. Least of all among some of the tribes of ants have we prospect of inducing them to beat their swords into anty plowshares, if such there could be.

There are several races of occasionally warlike tribes among the ants. Notably we find them among the blacks and the reds. The former are carpenters or workers in wood; the latter excavators in the earth, deft at building intricate homes thoroughly equipped with nurseries, storerooms and long hallways. And between them there are feuds which force us to change the phrase "Go to the ant, thou sluggard" into "Go to the ant, thou slugger."

Our common black carpenter ant is *Camponotus herculeanus pennsylvanicus.* The generic name refers to the little creature's fondness for caterpillars; the second term carries the popular idea of its strength and is sub-generic; the specific name is given because the first locality from which specimens came to the naturalist DeGeer was Pennsylvania, although nearly all of North America is the habitat of the species. The somewhat less common large red ant of the eastern states is known as *Camponotus herculeanus ferrugineus,* the latter given because of the insect's reddish tints.

The disputes between the red ants and the blacks are mostly brought about by the raiding instinct possessed by the red ants only. Black carpenters, while not exactly peaceful and often looking for a fight with insects of nearly all kinds, and with spiders, are not inclined to covet the hard-earned fruits of the labors of other ants. It is interesting to note that sometimes the blacks and reds dwell together quite amicably; again their hunting-grounds overlap and they merely avoid each other, the blacks being particularly shy and retreating rapidly when coming in contact with their hereditary foes, the reds sometimes eager to follow, but never far. The large worker blacks, which are sometimes referred to as soldiers, although they work and hunt as do the small workers, are willing to fight even when opposed by the larger red ants. The smaller reds retreat before these big blacks, or are, in the wars, seized and killed

THE BATTLE STARTS

They seize each others' legs and antennae before clinching, the battle going to the quickest and most powerful warrior

by them. But, when two of about the same smaller size meet, the black generally retreats and when they must fight the red is generally the victor. Is it possible that by some means individuals know the relative size and advantages of those foemen they chance to meet?

When these raids occur the blacks are always defensively valiant. In the several battles between reds and blacks that I have observed the attacks have been made when there was a dearth of soldier blacks and the attackers were all big or medium-sized fellows, never a small worker among them. This accounts for the victory of the reds which nearly always follows, for size is a governing influence. Therefore there is a general slaughter of the blacks and the purpose of the raid—a wholesale kidnaping of the larvae and the pupae of the conquered colony—is carried out. These undeveloped young are reared as are the natives, and later black workers may be seen mixing in and laboring along with their foster nurses and step relatives. Long lines of the reds after a massacre may be observed carrying the larval and pupal cases from nest to nest.

A RED "SOLDIER" WINS

It conquers a smaller black worker by crushing the head of the victim with powerful jaws

Fatalities occur in these combats by the stronger ants crushing, with powerful jaws, the head and sometimes the thorax of the foeman. With a magnifying-glass I have examined scores of dead ants, and after a raid invariably found such wounds; these cause a rather lingering death.

To test this matter of relative fighting power I have placed a large red ant in a bottle with a slightly smaller black, and when they met and tangled the black was quickly killed. I put a small red worker in the empty bottle with a large soldier black. The latter was eager for the fray and seized the red, killing it in two seconds. A soldier red introduced to the soldier black compelled a fight that lasted more than an hour before they killed each other, one having its head crushed, the other its mesothorax punctured. A battle to the death between lions and tigers could hardly have been more exciting.

CARRYING HOME THE SPOILS

Red ants taking home the larvae and pupae of the black ants after a successful raid on their nest

These raids of the reds on the blacks are not infrequent, but rare are the battles between two colonies of the reds, undoubtedly founded by tribally unrelated queen ants. The cause of the quarrel is not easily ascertained. Perhaps one tribe was in error regarding the defensive power of the other and started a raid. In these battles the winged or wingless queens also come forth and take a hand, generally becoming victims. Thus there is small chance of the annihilated colony's continuing. Most of the frenzy is felt by the observer when several swarming combatants, eager to vent their spleen upon anything and everything, attack a hand resting on the battleground.

Dead ants large and small strew the ground over a space of some four square yards nearly bared of vegetation and flanked by the nests of both colonies. Warriors are rushing about "like roaring lions", minus the roar. Victory rewards the contestant who is enabled to get the first hold with its wide jaws on the foeman's head. Frequently after thus winning the victor is handicapped by its victim's having seized one of its feet, or an antennae, in jaws that never, even in death, relax their grip. Thus all over the field dead ants are being dragged about, the killers never having the sense to liberate themselves by biting off their own tarsi. Often legs and feelers and sometimes heads are severed.

Often two or three ants will attack a single foeman irrespective of size, for there is no sporting instinct, no honor shown, no quarter asked nor given. In such unequal contests fatal wounds are given by the many so that the victim looks somewhat pulpy. I was at first inclined to believe that, due to the general ire and fighting spirit, members of the same colony fought also with each other. Such is not the case, for I have noticed a warrior, rushing past the entrance to its nest, encounter another just emerging and after a swift greeting both turned away to seek an enemy. Scent is alone responsible; having no eyes with which to detect anything but relative light an ant cannot discern its fellows other than by the antennae which are both smellers and ears in the insects.

Every individual scrap is a game fight, a tangle of legs, jaws and bodies, generally soon over where there is a big difference in size; otherwise often prolonged. Fury and fearlessness mark all of these onslaughts, but is it not strange that in the general effort to insure a continuation of a species a slaughtering habit has arisen that wipes it out?

Observation of these terrific battles in the fascinating world of ants is only one of the many interesting studies awaiting those who inquire into the habits and manner of life of members of the insect world.

SNOW GEESE AND BLUE GEESE RISE ABOVE THE WATERS

The blue geese are numerous enough to suggest great numbers but they are not frequently shot by hunters and are in less sad state than many of our waterfowl

NO CLOSED SEASON

The camera hunter knows no posted grounds

By ALFRED M. BAILEY

Director, the Chicago Academy of Sciences

THE duck hunter is now limited to twelve birds each day. He may, if he is lucky, shoot four geese. There is no doubt that our migrating game birds have been decreasing alarmingly during the past ten years. We can not place the greatest blame on the drainage of marshes and the advance of civilization, for there were approximately five million hunting licenses issued the past year. With so many licensed hunters afield it would be strange indeed if game birds were able to hold their own. The fall of the year, the tang of autumn in the air, the changing foliage of the marshland, and the resonant call of wild geese as they make their aerial trek to their southern feeding grounds, arouse the hunting instinct. It may not be long, however, before there is nothing to shoot.

I was making motion picture films in the coastal marshes of Louisiana at the mouth of the Mississippi River when the flight of northern birds started. It was the middle of October. A few blue geese had been seen, but the large flocks had not yet arrived. Then, one gray morning when the wind had been blowing from the north, we started for our tule blinds along one of the tortuous bayous. We saw a flock of blue geese circling as though to alight, and as we drew near the spot we could hear the clamorous uproar of thousands of wild voices, even above the noise of the motor. Several thousand birds raised from their feeding places in the marsh, and, after milling about for a few minutes, the whole calling mob drifted southward and alighted at the mouth of Main Pass. We took our places of concealment that we might photograph the various species of waterfowl using the lagoon. And, what a sight we witnessed that day! The blue geese were arriving from their feeding grounds—remote Arctic islands north of the North American continent. From nine o'clock in the morning until four in the afternoon, we had a constant procession of blue geese. There were from one to three flocks in the air at all times, all passing directly over our blind and each flock calling, those overhead being guided by the voices of those which had passed, apparently,

THE AUTHOR BESIDE ONE OF HIS BLINDS

Patience and planning are the secret of shooting with a camera, but the subject may be shot again, which is more than can be said of the gun's victim

DECOYS BRING SNOW AND BLUE GEESE WITHIN CAMERA RANGE
Decoys also bring them within the range of the hunters' guns. With the camera we have such a record as this; with the gun the flock will soon be much fewer

while they in turn guided the ones in the rear. We estimated that from twenty to fifty thousand geese passed in review during the day. Such a sight is sufficient to arouse the enthusiasm of most any photographer and make him believe that our game birds are really as numerous as years before. The blue geese, however, are peculiar birds. Few of them are taken by hunters, for the bulk of the species winters along the Louisiana coast, and they nest in remote regions. Other species of geese and ducks have fared infinitely worse.

I was anxious to secure motion picture films of this great flock which had settled on the sand bars at the mouth of the river. When the sun was peeping above the quiet waters of the gulf the following morning, we were paddling along in a pirogue, while my Eyemo was propped in the bow with the six-inch lens in place. An occasional flock circled overhead, giving me a few flight pictures, but I desired to photograph the large flock and did not shoot much film on these scattered birds. I found, to my dismay, that the birds were feeding in a great estuary where it was impossible to paddle up on them, so, taking the Eyemo in the palm of my hand and getting to my hands and knees, I started a two hundred yard stalk. It is not necessary to tell how unused muscles suffered in that approach across oozy ground. A little tidal stream had to be crossed, a cane thicket traversed—and I was in the midst of the feeding horde. But it was difficult photography, for the water was too deep for me to sit down, and I dared not stand up. I ran out one hundred feet, reloaded the Eyemo, and took the great flock as it sprang in the air. There was a thunderous roar of thousands of wings, and then the crowd of birds passed down the coast until they showed merely as dark masses in the sky.

The following week I worked from a blind in Cameron Parish in western Louisiana. The first day of the hunting season was before us, and my host, Lutcher Stark, and his friends were down for the opening day's shoot. The marshes extended for miles on either side, while the Gulf of Mexico was not far distant to the southward. Mr. Stark has vast areas which are in the heart of the wintering grounds of our North American wildfowl, and the birds are so numerous it requires no great skill to secure a "bag". Twenty-five ducks and eight geese had been allowed to a hunter, but the bag limit has now been reduced. Mr. Stark has lived in the south, and his parents, and their parents before them, so the birds of the marshes have been old acquaintances. He has seen the marshes drained and the uncountable thousands of birds dwindle until now there are pitifully few except in a few favored spots. Recognizing the need of smaller bags, he anticipated Federal regulations and restricted his guests to fifteen ducks and four geese, remarking as he did so,—"If any of you boys need more food, I'll buy you a turkey."

THRILL AND BEAUTY IN WILDFOWL FLIGHT
But today our migratory wildfowl are in a sad state from over-shooting, baiting, use of live decoys, drainage of breeding areas and the recent drought in many sections

ICK OUT THE REAL BIRD FROM AMONG THE DECOYS
A young blue goose alights and is photographed among a group of false geese fabricated from oil cloth and upholstered into a rough image of the real thing

It was early when we were called by the cook. I found Bobbie, a shooting companion of other days, stowing ilcloth goose decoys in our pirogue, and we were soon n our way to a tule-grown lagoon. There is no need to vrite about the dawn breaking over the southern marsh ands; about the thousands of ducks and geese which tarted moving from their resting places to their feeding grounds; about the flocks of beautiful roseate spoonbills nd picturesque wood ibis, herons, and rails. It is a sports-nan's paradise—that remote little section of western Louisiana—and we found our morning in the blind one f constant delight. Flocks of ducks and geese came zip-ing over the decoys while we crouched motionless. I had ample opportunity for pictures. Bobbie would call now geese in, so they would hover over the decoys, and often nearly graze the blind as they passed overhead. Finally, after watching for some time, he confided in a whisper, "I wonder why hunters don't get one of these little movies; they could have plenty of fun. You just took that lone snow goose for the third time. He is one I flushed out of the decoys a while ago. Now, if we'd shot him, we'd seen him only once."

Then, there is another kind of bird photography. In the spring of the year when birds are nesting one can obtain the best results. For the photographer, there is no closed season, and I have found that "No Trespass" signs are not to be taken literally. All is game which comes to the camera, and, usually, the smaller the bird the more fun to obtain good results.

I first started taking pictures because it was difficult to find good shooting. I found there were many subjects to be photographed in the little (Continued on page 192)

A GROUP OF SNOW GEESE ON THE WING
Coming back to their winter home after a summer spent on breeding grounds in the far north. This year many of these areas were badly restricted by the drought

A Nuthatch at Sea

By FREDERICK C. LINCOLN

REPORTS of land birds seeking refuge on ships at sea, while by no means uncommon, are usually of migratory species that are known to make long flights. The nuthatches as a group have large wings in comparison with their weight, but nevertheless they are not usually considered as birds that travel long distances, particularly in non-stop flights. Accordingly, a letter written by Mr. William Mackay, of the Angler's Club of America, New York City, and which has been brought to the attention of the Biological Survey by Mr. J. Miles Flynn, President of the Nassau County Chapter of the Izaak

Walton League of America, is of unusual interest. Mr. Mackay writes as follows:

"On October 14, 1933, I was drifting for weakfish about five miles off New Inlet just south of Beachhaven, New Jersey. Straight in from sea came what was obviously a land bird. Tired to exhaustion, it seemed barely able to reach Mr. Lou Bogart's rod, which extended over the stern of the boat and afforded it its first perch by several feet. My little Volenda camera was on the engine box and

THE NUTHATCH FINDS REST

At first it poised on the fishing rod, weary from flight, and then fearlessly perched on the back of the fisherman

I immediately snapped. Next, after a bit of a rest, the bird moved to a perch on Mr. Bogart's shoulder. This was similarly recorded. . . . There was no evidence of fear or distrust displayed by the bird during its stay of about one hour. Miss Hopper played hostess and some bread crumbs were offered and accepted. Off on the horizon a water tower marked Beachhaven. After a few trial trips around the boat the bird headed directly for the tower, much to our relief. The bird, I believe, was a nuthatch."

Despite the fact that the original pictures were but little larger than a postage stamp, they have enlarged with sufficient detail to establish the identity of the traveler as a red-breasted nuthatch, *Sitta canadensis*. This is probably the most migratory of the North American nuthatches, and in some autumns it is found in large numbers along the Atlantic coast, as far south as Florida. In the eastern part of the country it breeds regularly from New York and Massachusetts north to southern Quebec and Newfoundland, and in high sections south to North Carolina

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On the next page the new pictorial rotogravure section of Nature Magazine makes its initial bow. This will be a regular feature of our pages from now on. The pictures have been carefully chosen for their permanent value as well as for the interesting story that they tell. The captions have been prepared with equal care to present a condensed story. We will be interested in the frank reaction of our readers to this new feature and will be pleased to have any suggestions

The Life of a Trap-Door Spider

as recorded by Lee Passmore and F. E. Beck

INSECT life is full of fascination and examples of ingenuity that suggest the exercise of intelligence and reason. One of the most interesting of these is the life and architectural ability of the trap-door spider of California and other Southwestern States.

In the picture above we see the female trap-door spider breaking ground for her nest. She first tears away all the moss covering the spot, pulling it up by the roots but saving it for later use. Then she goes to work excavating her burrow, using her two sharp fangs, her palps and front legs. Small stones and pellets of earth are flicked away to a distance by the front legs. This is to leave no evidence that the work of excavating has been going on. The burrow the spider builds is about eight or ten inches deep, with a diameter of a little more than one inch.

After the burrow has been dug to the proper depth, the spider indents the soft soil inside with the rounded part of her fangs. Her purpose is to make solid the inner walls of the nest and to prevent rain from seeping through the earth below her door. She then spins a silken web over the entire interior, and, also, on the under side of the door. Since this lining is protected from dampness, it becomes a beautiful ash-white color, with a peculiar sheen that makes the walls of the nest appear as though painted. The door is perfectly waterproof and able to resist the heaviest downpour of rain. The spider usually selects a little knoll as a nest site so that the water will run off.

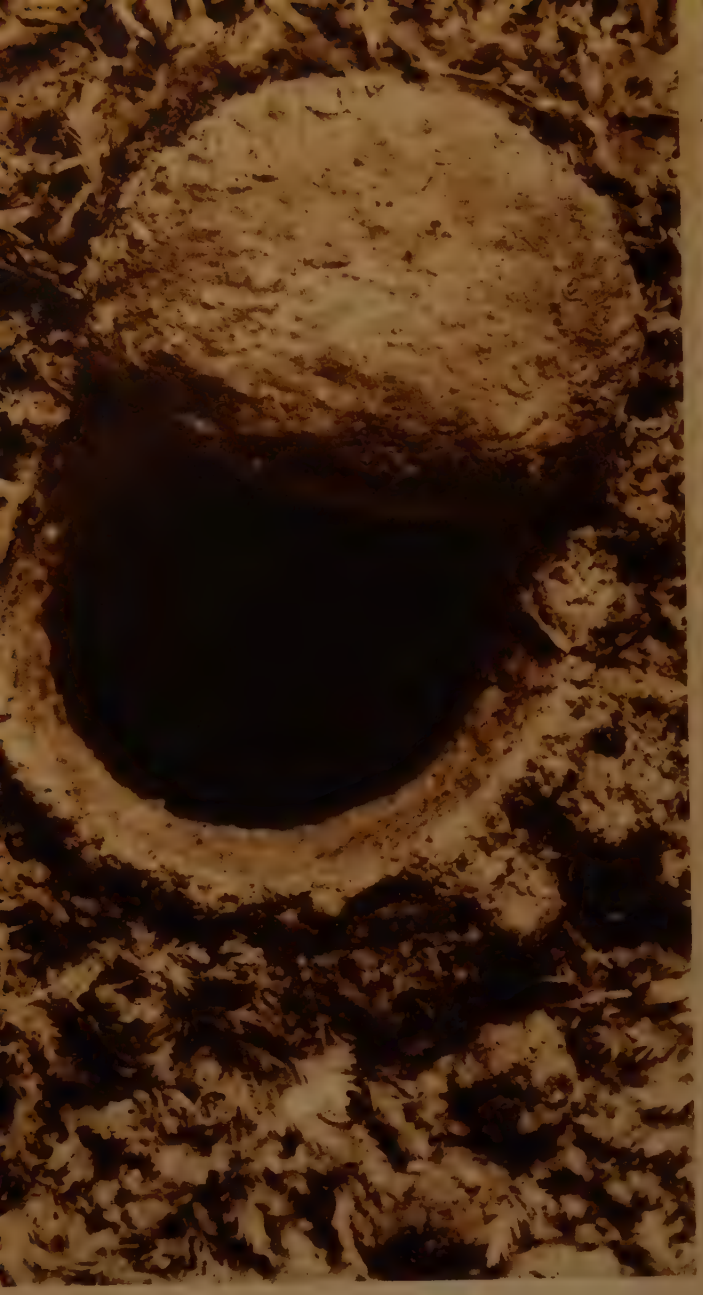
Trap-door spiders have two mandibles and fangs, the latter serving many purposes. With them she captures and kills her prey, digs her burrow, indents the walls to make them solid, and holds her door against the intrusion of her deadly enemy, the spider wasp. This wasp will sometimes dig through the door and enter the burrow, where it may overcome the spider by stinging and paralyzing her. The wasp, if successful in its attack, deposits an egg on the body of the spider. The egg, when hatched about two days later, becomes a grub that bores into the body of the spider and lives there, slowly eating the juices and tissues until death comes to the victim. It then leaves the body and constructs a cocoon, within which it completes the final stages of metamorphosis.

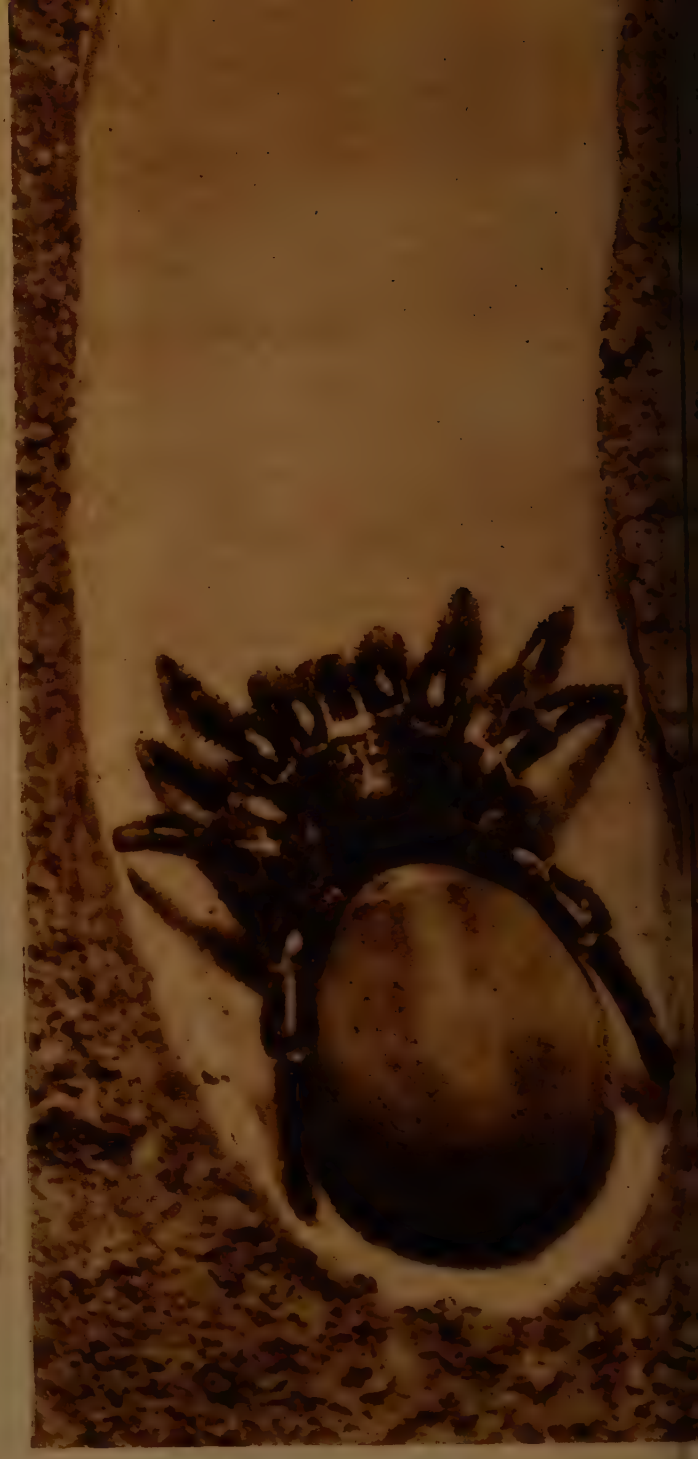
On succeeding pages we will see the trap-door spider engaged in the ingenious work of fashioning its home.

Here the spider is shown as she packs the earth into a solid mass at the side of the entrance to her nest where the door will be when finished. The earth taken from the burrow is built up, disk-shaped, in a vertical position. It is held together by a web applied to the under side. When it is nearly large enough to cover the opening, the spider will pull down on the partly finished door, causing the earth farthest from the rim at the top to break. Since the web prevents the separation of the lid from the outer edge of the burrow, the break forms a straight line. In this way the hinge is made.

Now the door has been pulled down over the opening so that the spider may see how much more earth is required to cover it. The hinge to the door is plainly shown. The spider has already started to transplant some moss on the top side of her door. She will push the partly-made door back into a vertical position and then add more earth and webbing until it is slightly larger than the opening to the nest.

ove, the spider is seen using her nnerets. They are at the upper ge of the unfinished door. She is ing webbing on the under surface the lid and down into the burrow, s forming the base upon which the or will swing. At the right we see finished door, tightly drawn down o the entrance of the burrow. Moss been transplanted on the top of door. Soon the door and the sur- nding earth will be covered with a se growth, making the nest diffi- to find. Note how plainly the hinge to the door shows.





Above is a newly-made door about two weeks after it was finished. The holes made to hold the spider's fangs appear at the center near the top of the lid. Thus placed they give the spider leverage when holding her door against an intruder. The door is much like a compression valve, beveled to conform with the outer rim of the burrow. The spider opens and closes the door many times while it is still pliable, thus seating it.

At the upper right, the little carpenter of the hills rests in her silk-lined chamber. Here she will spend her entire lifetime, never allowing her door to close behind her, leaving her on the outside.

At the right are newly-hatched spiders. They may remain with their mother eight months. Soon after the winter rains she releases them and they immediately start their own burrows, building on a smaller scale as becomes their youth.

Above, the spider has pounced upon a luckless sow-bug. She is just sinking her fangs into her prey. The door is held up by the abdomen of the spider, but it will automatically drop shut as she takes her victim into the burrow, there to feed on its juices. Uneaten parts will be brought to the surface and cast outside.

At the right is a typical cork-type nest built by a California trap-door spider. In the burrow was the owner, a remarkable specimen that had lived there unmolested for seven years. The time of occupation is estimated by the number of layers of web that have been placed on the under side of the door, one layer is added each year.

THE AMERICAN TOAD—*Bufo americanus*. Photographed by Justin Rau

OCTOBER

Her gown is like a broidered tapestry,
Among whose folds the brilliant colors play.
She wears a mysty scarf all shot with stars,
And at her waist a riotous bouquet.
With soft-shod feet she steps from hill to hill,
Gloriously vivid, calm, assured, until
Her younger sister stealing unaware,
With shrieking voice and jealous hands doth tear
The gorgeous fabric of her robe threadbare;
The rage-mad passes on with glee elate
And leaves the dying year disconsolate.

ALBERT HARLEN CASTLE

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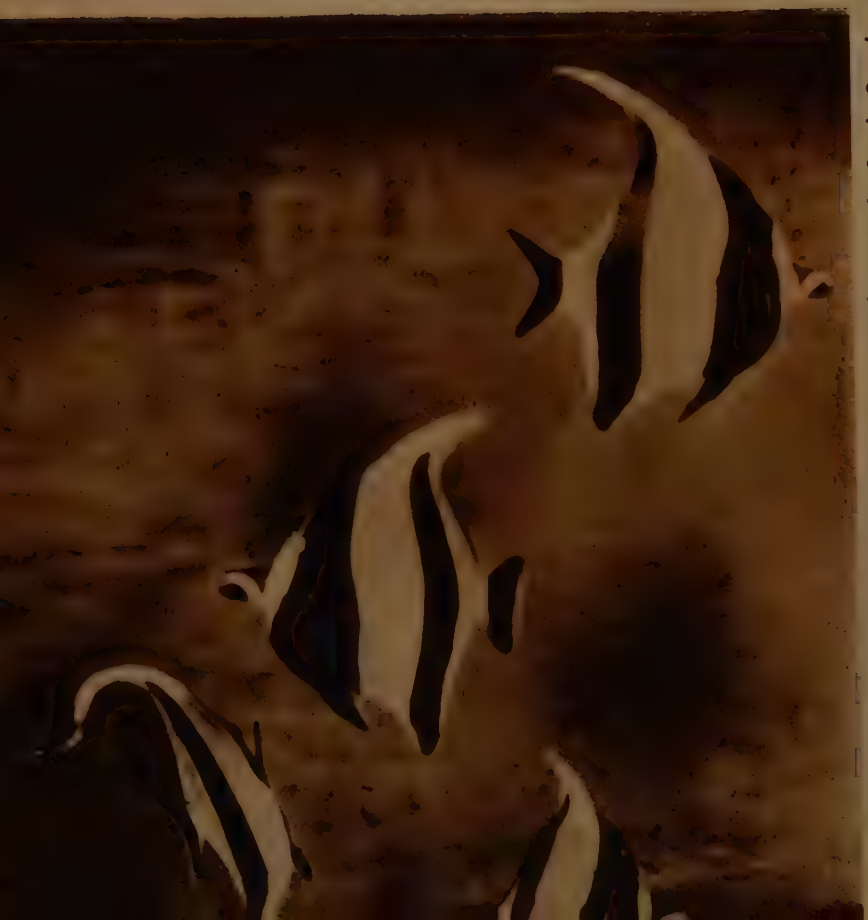
And at the right we see what is now only a memory of October—the chestnut in its bur. There are many who can remember chestnutting time after the first frost of Fall, but the blight, like a tropic gale, has swept our chestnut trees before it and robbed us of a synonym for Autumn. Photograph by Keystone.



The puffers, one of which we see above, include several species. They share a family trait of being able to fill themselves with air or water and to swell up into what is almost a ball. Thus the puffer makes himself too much of a mouthful for a larger fish that has made up its mind to have him for dinner. When inflated puffers are helpless and float, upside down, on the surface. In some species the skin is smooth, while in others it is covered with spines that stand erect when the fish is blown up. The gills are reduced to slits. Photograph by International.

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Little finny fellows from the waters of the Hawaiian Islands. There they are known as Kihikihi, which expresses their color. "Ki" means black and "Hi" white. It is up to you to decide whether they are black and white or white and black. Photograph by International.

Some Birds of the Sea and Surf

Because many of them are infrequently seen by the majority of the people there is an element of mystery about the birds who make their homes near the waters of the sea.

Above is shown *Aphriza,* the surf bird, which has been known to ornithologists for a century and a half, but which, until a few years ago, guarded a deep secret. Until 1927 no one had found where this bird nested. Then Dr. Joseph Dixon of the University of California found a nest on a barren rocky ridge, a thousand feet above timberline on the north slope of the Alaska range. While Dr. Dixon watched the nest the male bird did all the incubating. The bird migrates from its winter home about the stormy reefs of Magellan Straits to the northern tundras of Alaska.

At the right is a young Man-o'-War Bird or Frigate Bird, *Fregata magnificens,* on its nest. It will grow up to be a flier of great grace. The species is found about tropic seas, including the Gulf of Mexico, and visiting southern Florida. Photographs by Cartwright.

Above, a group of gulls engage in raucous
ment on a beach on the coast of Oregon. T
familiar scavengers of the sea make up in g
of flight for their lack of musical attributes. PP
graph by Thomas.

At the left a baby California murre poses q
ly for his picture, or, perhaps, it's her pic
Photograph by William L. Finley.

Below is a colony of Farallon Cormorants
tographed many years ago on the rocks in
Lake, California. These birds, including se
sub-species, are widely distributed. They fee
fishes, and on the Farallon Islands nest on lec
making nests of kelp and fresh seaweed.
lay two to four eggs. Photograph by Fi

Gannets of Bonaventure Island off the Gaspé Peninsula in Canada. They are the largest of the sea birds of our North Atlantic Coast. They breed in the north, as here shown, and in winter range along the Atlantic Coast to Florida. They are white birds with black-tipped wings, conspicuous against a winter sea. They nest and live in colonies, enjoying companionship. Their nests, situated on steep cliffs and constructed principally of seaweed, hold but one egg, which is pale greenish-blue, flaked with chalky white. The young birds have a peculiar spotted appearance because the brown feathers with which they are covered are each centered with a wedge-shaped dot of white. They live, of course, on fish, and are adept fishers. Photograph by H. Armstrong Roberts.

Above, a colony of California Murres, the most abundan
sea bird on the off-shore rocks of the Pacific Coast fro
Alaska to the Farallones. They live in great colonies, layin
a single egg on the bare rock. The eggs are top-shape
and this often keeps them from rolling to destructio

At the left a young Farallon Cormorant, and, below
the left, a baby gull who obligingly posed for the camer
of Olin S. Pettingill.

Below is a female Man-o'-War Bird on her nest. The
are tropical birds that come only to our southern bo
ders. They nest in low trees, or now and then on rock
in flimsy nests in which they lay from one to three egg

Baby gorilla in the Houston, Texas, Zoo puts on his sweater and then decides that, after all, it isn't sweater weather. One guess is as good as another as to what he is thinking about both the sweater and this business of being photographed.

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Babes of the Animal World

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Mealtime for a youngster of the mountain cliffs. This baby Mountain Goat, left motherless, was adopted by William L. Finley and successfully raised, in company with a young antelope and several other pets. When his instinct told him he should be climbing from the side board to the table, and thence to the top of the china closet, he was sent to the zoo, where there was a nice jagged rock for his climbing

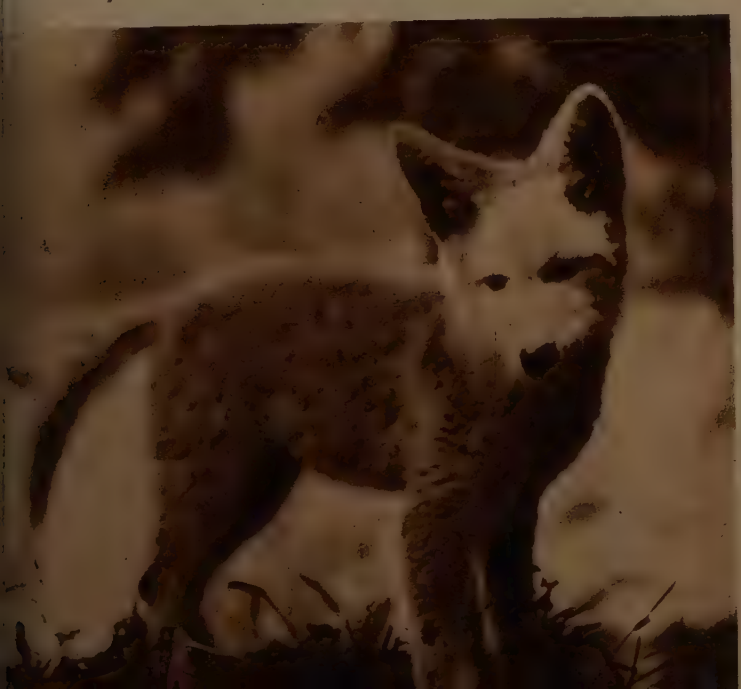
Baby mule deer fawn takes a lesson in photography from Arthur Newton Pack, President of the American Nature Association, who knows his photography. This youngster, orphaned by the vagaries of those who still hunt with gun instead of camera, was met on one of the camera-hunting expeditions led by Mr. Pack into Alaska.

A blessed event in the menage of Mrs. Buffalo. This event took place in the Zoo in Bronx Park, New York, one Saturday afternoon. Two hours later both mother and child were running around enjoying the air and sunshine. The young man was, to be sure, mostly legs and none too sure of those, but he managed to get around with mother's advice and solicitous attention. Photograph by International.

Two baby lion cubs, born to a proud mother in the Houston, Texas, Zoological Park, seem to consider this world a curious or a boresome affair.

Youthful white coyote surveys the world. When a den of coyotes was found by men killing predatory animals, this white pup was among them. He was not a complete albino, for his eyes were not pink. He went to the home of William L. Finley in Oregon, where he lived until he was too old to be safe for visitors. Not being schooled in the ways of the wild, he was sent to the National Zoo.

"My what a tall tree I am in," says the bear cub to himself. Or, at least, that may be what he is thinking about. And he would be justified because he is gazing out of an eleventh story window at the strange world of men, with shiny big black beetles running up and down smooth trails. Some instinct seems to tell him it is all wrong, but he was orphaned young by some hunter.



BEAR GRASS IN MOUNT RAINIER NATIONAL PARK. IN THE BACKGROUND IS THE TATOOSH RANGE AND IN THE DISTANCE IS MOUNT ADAMS

ONE OF THE ACTORS IN THE PAGEANT OF AUTUMNAL COLOR

PHOTOGRAPH BY L. W. BROWNELL

Fall transforms the leaves of the oaks by an intricate process of Nature's chemistry. Only in certain parts of the world do people enjoy the color changes of the fall season

Autumn's Pageant

Why the leaves turn gold and scarlet and what makes them fall

By CAROL H. WOODWARD

NEARBY groves and distant hills and mountain slopes are ablaze with October color. Autumn is touching the maples, the oaks and the poplars, transforming the dark green of their summer foliage to scarlet, russet and clear, limpid yellow. Sumac borders roadsides with bands of vivid red. Woodbine lays a cloak of scarlet over tree-trunks, fences and stonewalls. Some of the dogwoods, oaks, and ashes are purplish. Many leaves become rich brown just before they fall; and some, like those of certain oaks, change gradually from green to red to brown and then cling to the branch until spring.

What makes the summer foliage thus change color and eventually leave the tree? Is it the change from summer warmth to frost of autumn? Is it the wind? Or does some chemical change take place of which we are only subtly aware?

Those city dwellers who every year plan special trips to the country or up the river to see the autumn foliage, and those in the country who watch for the first tinge of red on a maple branch, do not realize how privileged they are. In only a few regions of the world do the trees, shrubs and vines put on an autumn pageant of color. People in parts of Germany watch the trees turn gold and scarlet every fall, but not in southern France or Italy. Boys and girls of eastern China know the glee we feel when October days bring crisp air and brightly colored leaves, but through the vast central part of Asia there is little color in the trees in fall. All of Africa and most of South America are similarly barren of bright foliage, but away down in the southern part of Argentina, one small area undergoes changes of colors in autumn leaves while we of the northern hemisphere are having our spring.

Even here in North America, where autumn colors are more richly developed than anywhere else in the world, not all of us see the oaks and maples clothed in brilliance in the fall. Beyond the Great Plains west of the

Mississippi Valley there is scarcely a sign of red in the October scene. But from the Mississippi eastward, and northward to the St. Lawrence River, every autumn the trees put on a show which sets the countryside for miles aflame with color.

In these regions, deciduous trees are the dominant type, explains Dr. A. B. Stout of the New York Botanical Garden, who has studied and lectured on autumn coloration. The climate provides two sharply contrasted seasons, he points out: a warm summer with considerable rainfall and a cold winter with temperatures that prevent growth. In summer, the trees put forth leaves that are relatively tender and short-lived. As they die at the approach of cold weather, rich colorings develop.

In other regions, either the climate is so dry in the late summer that leaves fall from lack of moisture to keep them alive, or else the trees are evergreen, and, while they do turn a darker color when cold weather comes, they add nothing to the brilliance of the scene.

If you watch carefully, you will discover that it is not necessarily after a frosty night that the leaves suddenly take on their autumn hues. Neither is it after a heavy wind that the leaves fall. These events, which make outdoor life spectacular every autumn, are but natural processes in the life of the leaf, carried on regularly within microscopic cells, and bound to happen to certain plants in certain regions every year.

MAPLES ARE MOST COLORFUL IN AUTUMN PHOTOGRAPH BY EUGENE J. HALL

A perfect tree within whose branches and leaves the fall colors are being fabricated to delight the lover of beauty

To understand what makes the leaves change color and then fall from the branch, we must go back to the springtime and follow them briefly through their growing season.

Each leaf is composed of tiny cells—which are partially filled with still smaller living bodies called *plastids*—which float continuously through the cell sap. In the active, living leaf these plastids are green and are called *chloroplasts,* because they are colored with *chlorophyll,* which means "leaf green."

It is these minute chloroplasts which make possible the existence of plant, even animal, life on the earth, for they are the fundamental food-producers of the world. Without their activity, plants could not grow and animals would have no vegetation upon which to feed.

When a man wishes power for a mill to grind wheat, he usually seeks a waterfall, transforming the force into electricity. But when a plant needs power for manufacturing the food that is to nourish it, the chloroplasts capture energy from the sun, simply—but miraculously—absorbing it from the sun's rays, and using it to break down chemical compounds and recombine them into the food.

The chemical compounds used in this remarkable factory within the leaf are carbon dioxide and water. The water is taken in by the roots and carried up into the green tissues of the leaf. Carbon dioxide, of which there is always a small amount in the air, is gathered in through automatic doorways more marvelous than those that are controlled by an electric eye. For these minute openings—so tiny that more than 1400 of them can be found on the under side of a single apple leaf—open and close according to the plant's needs.

Through these doorways, called *stomata,* then, comes carbon dioxide, which the chloroplasts, using the energy derived from the sun, promptly break down into carbon and oxygen. At the same time, they are reducing the water to hydrogen and oxygen. Then, in less time than the practised eyes of scientists have been able to determine, these raw elements are built up again into starch, which the plant uses for growth. First, however, the starch must be made soluble, so that it can be carried in the cell sap.

If you mix a starch, such as common flour, in water, you note that the water remains cloudy. Sugar, however, you will observe, dissolves quite readily in a liquid medium. Much the same situation exists in the leaf. Fortunately, soluble sugar is readily derived from insoluble starch—their chemical compositions are only a trifle different—and it is believed that an enzyme

seeps through the cell walls and brings about the necessary change. (An enzyme is a mysterious chemical substance which is capable of changing other substances without being altered or consumed itself.)

So the starch in the leaf is transformed into sugar and thus carried throughout the plant, where it is utilized for growth, or changed back into starch, for storage, as in the potato.

All through the spring and early summer, the little chloroplasts are busy in their factory within the leaf. The more starch they manufacture, the faster the tree grows. But by midsummer the foliage has reached maturity, and the chloroplasts slow down their activity. No longer do they send sugar-laden saps rushing from the leaf into other parts of the plant. They take life comfortably, as befits their age, working just enough to maintain their position.

All coloring matters in plants are unstable, chemically, and are readily changed from one into another. Thus the chloroplasts, as they diminish their labors in the manufacture of starch, are easily transformed into yellow plastids, whose chemical colorings are known as *carotinoids*. Some leaves, such as those of the willow and poplar, and in the East the magnificent tulip-tree —also the ginkgo which has been transplanted there from temple grounds of Asia—soon become a bright, clear yellow. In other leaves, the carotinoids, some forms of which are called *carotin* and some *xanthophyll*, are orange or red, and they tint the trees accordingly.

Then there is another type of coloring in the leaf, which, instead of being in plastid form, is dissolved in the cell sap. Botanists and chemists alike admit that this matter of autumn coloring is a difficult problem to dissect, but they believe that all season long these soluble colors, which are known as *flavones*, are present in more or less colorless form in the cell sap. But it takes certain conditions to bring them out in the bright hues they are capable of assuming.

Sunshine is usually necessary to chlorophyll. It also is necessary if the colorless flavones in the cell sap are to be turned into tones of red and purple and blue, in which state they are called *anthocyanins*, the same chemical substances which give color to many flowers. One difference between anthocyanins and chlorophyll is that chlorophyll is readily replenished in the presence of heat, whereas bright-colored anthocyanins are formed best when cold is predominant.

Sugar is also more or less essential to their appearance. If you look carefully at the leaves on some trees, right at the point where the stem of the leaf joins the branch, you will find, on the under side, a trace of an indentation. At this point, about midsummer or a little later, a layer of corky cells slowly begins to form, working its way step by step across the base of the stem.

The sugars derived from the starches and dissolved in the cell sap at this time start down their usual route into the stem; but at the base of the stem of the leaf they find themselves unexpectedly blocked. The layer of corky cells has formed nearly all the way across. A few sugars escape, but the rest are obliged to remain within the tissues of the leaf. The flavones seize upon them, and, taking equal advantage of the noontime sunshine and of the increasing coolness in the atmosphere, produce gay autumn colors for the delectation of the wondering world.

The layer of corky cells grows further across the stem until it reaches the other side. Meanwhile, the cells just above it have become spongy, then gelatinous. Again an enzyme is believed to have wrought this otherwise inexplicable change. Finally the cells reach such a state of dissolution that the leaf can no longer cling to the branch. By its own weight it falls, leaving the corky layer to protect the wound where it was severed from the branch.

Directly above this scar, in the angle formed between the leafstem and the branch, the bud of next year's branchlet is already formed. It will rest there unobtrusively over winter, frozen, perhaps, but still alive. As soon as spring sunshine and warmth stir the sap flowing in the tree and force the buds through their winter covering of scales, the chloroplasts in the young leaves will begin their routine manufacture of starch, by which the year's growth will be carried on. And again, when midsummer comes, the leaves will grow sedentary; chlorophyll will gradually decrease, and yellow carotinoids instead will give their color to certain leaves. The corky layer will commence its growth across the base of the stem; sugar will be held within the leaf, and when cold weather adds its influence to these color-forming factors, many leaves will turn their customary red or purplish hue.

What makes poplars yellow in the fall and certain maples always red is a hereditary matter which is bound up with the adjustment of each species to the climatic cycle in the region where it grows. It is the plant's delicately balanced response to the changing seasons. From generation to generation, for a longer time than man can calculate, it has happened thus, each autumn giving to certain favored places a pageant of magnificent color.

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Is the coast of New Jersey sinking? How do chimney swifts nest and rear their families? What tree is called the grandfather of the pines? These and many other interesting questions are answered in articles scheduled for the November issue of Nature Magazine. Also we welcome back to our pages John Lindsey Blackford who will be remembered for his delightful Nature essays. With the November issue, also, we will present the Photographic Department under the editorship of Mr. Samuel Brown. Of course, there will be new pictorial surprises in the rotogravure feature.

COURTESY W. E. MARSHALL

A DISPLAY OF LILIUM TESTACEUM IN MASSED AND VIVID BEAUTY
Many still feel that the growing of lilies is a difficult gardening problem but actually it is not so with a little attention to the simple needs of these plants

YOU CAN GROW LILIES

They are not as difficult as many think

By ALLEN H. WOOD JR.

HAVE you admired groups of handsome lilies in your neighbor's garden and wished that they were in yours? Perhaps you feel that the growing of these plants is too ambitious an undertaking for an amateur gardener—that lilies must be pampered and can be grown only by experts. Such is not the case! Choose several hardy varieties, pay attention to their particular needs and plant the bulbs on some clear November day. Cover them with marsh hay or leaves and leave them to their long winter sleep.

A spot of vibrant green thrusts its way up through the moist soil of early spring. Shaped, perhaps, like a miniature pineapple or the bristles of an artist's brush, a lily has crept from its bulb into the sun. Grouped at the apex of the shoot are the embryo buds which later will develop into exquisite blooms, ranging in size and color from the glowing coral of tiny *Lilium tenuifolium* to the broad milk and gold loveliness of *L. auratum*.

Lilies are a splendid addition to any garden. They will rival the popularity of any group of plants when their peculiarities are more generally understood. The available species assure most gardens of a succession of bloom from June through September.

From Lombardy, Thibet, Burma and Japan, botanical explorers have made it possible for American gardeners to enjoy these fragments of old gold, white and flaming scarlet. Not all of the lilies will thrive in a single garden or in one section of the United States, but there are enough varieties to provide a continuous display in any garden.

Many lilies respond gratefully to cultivation, and in the confines of the garden produce height and florescence never found in their natural habitat. Other species resent the kindness of careful gardeners and prefer to remain wildlings. Many such lilies, however, present splendid subjects for naturalizing in suitable locations.

One serious drawback in the culture of these plants has been the necessity of importing the bulbs from foreign

countries. The long trip has proved to be a severe shock to the bulb, and in many instances the stock has been diseased upon arrival. The situation has been helped in recent years by American nurserymen who have propagated the bulbs of many of the lilies in this country, thus obviating the necessity of importation. When the demand for lilies has reached a point to make it commercially practical, undoubtedly all of the stock will be grown here.

The lily is so constructed as to lend itself readily to increase. Additional plants may be obtained from seeds, bulb offsets and bulb scales. In the case of *Lilium sargentiae, sulphureum, bulbiferum* and *tigrinum* bulbils which form in the axils of the leaves provide the increase. The question of propagating lilies in your own garden is one of health as well as economy. Lilies raised where they are to be permanent tenants have every opportunity to grow into healthier plants than those grown from imported bulbs.

COURTESY W. E. MARSHALL

BLOOMS OF LILIUM HANSONII

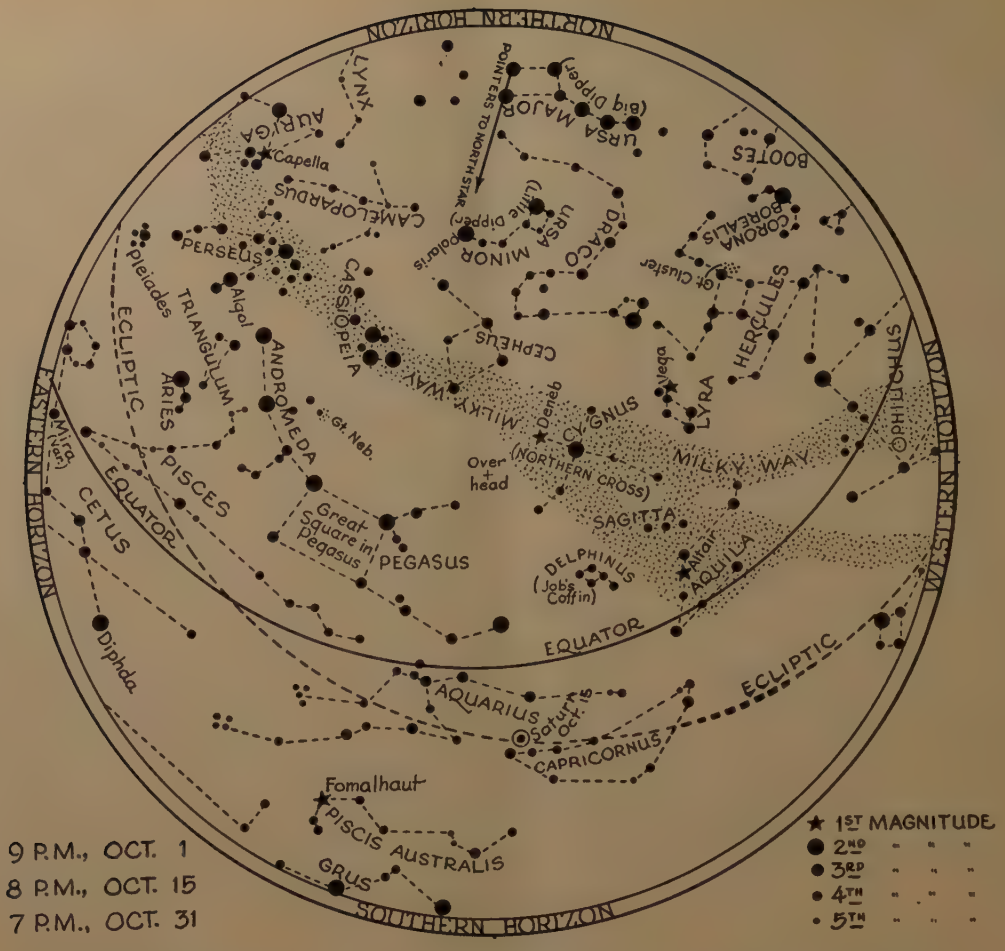
These may be successfully planted in the spring. Below we have Lilium auratum, whose milk and gold loveliness is a worthwhile adornment to any garden

Some lilies produce seed annually; others may be forced to with mechanical stimulation. Bulblets appear in many species between the top of the bulb and the surface of the ground, while nearly all produce bulb offsets. Loose scales may be removed from lily bulbs and planted in a sandy mixture of peat moss. Usually small bulblets will appear on each scale. Certain lilies are short-lived and tend to run out in a few years. *L. wilmottiae* and *tenuifolium* are of this type, but both may be raised from seed with no more effort than is required to raise ordinary perennials. Other lilies which have been satisfactorily grown from seed are: *L. auratum, canadense, croceum, candidum, concolor, henryi, speciosum, regale, monadelphum* and *davidi; canadense, candidum* and *speciosum* are slow.

Without taking into consideration any hybrids, there are nineteen species of native American lilies, twelve of which grow west of the Rocky Mountains. Most of these plants belong to the speckled red and yellow-orange group. Three of them, however, *L. washingtonianum, rubescens* and *kelloggi,* belong to the pink section and are difficult to establish outdoors in the East. Many of the other western species, such as *L. humboldti* and *pardalinum,* readily acclimate themselves to eastern gardens where they thrive and multiply in a most satisfactory manner.

Again excluding hybrids, there are ten European lilies for the garden. Asia has provided about forty-five species, several of which are not yet available. There are, perhaps, other species yet hiding in the rocky gorges on the fringe of China, or on the inhospitable slopes of the Thibetan Himalayas, which in time will be discovered by such earnest seekers as was the late E. H. Wilson. In the meantime there are sufficient species available to beautify any garden or delight any specialist.

While the old-fashioned tiger lily and the Madonna Lily have been grown in American gardens for many years, it is only during the past decade that the lily family as a whole has received the particular attention of gardeners. Slowly at first, but of recent years with increasing rapidity, professional and amateur horticulturists have found that lilies meet gracefully and beautifully the requisites of perennial border and rock garden. It seems strange that this cognizance has developed so slowly. Perhaps the taboo of imagined difficulties (Continued on page 189)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

ANDROMEDA and PEGASUS

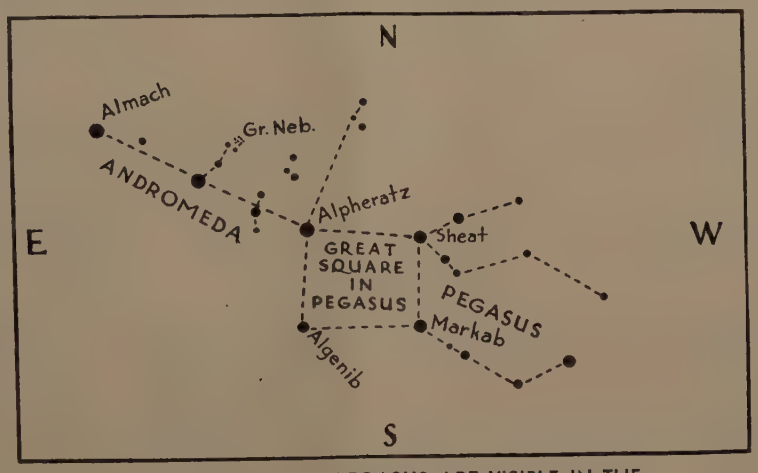
Two constellations of the October evening skies

By ISABEL M. LEWIS

TWO BEAUTIFUL and conspicuous constellations in view in the eastern evening sky on clear October nights are Andromeda, The Woman Chained, and Pegasus, The Winged Horse. According to an ancient legend Andromeda, who was the daughter of Cepheus and Cassiopeia, the king and queen of Ethiopia, was chained to the rocks by the sea-shore to be devoured by the sea-monster, Cetus, as a punishment to her mother who had presumed to declare herself superior in beauty to the sea-nymphs. Perseus, The Warrior, came to the rescue on his Winged Horse, Pegasus, just in time to save the maiden from this terrible fate. The six celestial figures involved in this legend are all in view in the evening sky this month. Even the dust stirred up by this famous steed in his haste to reach the maiden is represented in the star-clouds of the Milky Way, which lie in the constellations of Cepheus, Cassiopeia and Perseus.

The three stars of second magnitude, extending nearly in a straight line in a northeasterly direction from the northeast corner of the Great Square in Pegasus, outline the form of the reclining maiden. Alpha Andromeda, or Alpheratz, to give the Arabic name, which marks the northeast corner of the Great Square, lies in the head of Andromeda. Beta Andromeda comes next in order and marks the maiden's waist, and Gamma Andromeda, or Almach, the most easterly of the three, lies in the left foot. Algenib, or Gamma Pegasi, is a star of the third magnitude, lying in the southeast corner of the Great Square, and the northwestern and southwestern corners are marked by Beta Pegasi, or Sheat, and Alpha Pegasi, or Markab, respectively. These two stars, Alpha and Beta Pegasi, remind one of the Pointers of the Big Dipper, and, indeed, they would make good pointers to the Pole-star were they not so distant from it. They lie on

the opposite side of the Pole from the Pointers and closely in line with them and the North Star. They are exactly equal in brightness and of the 2½ magnitude. With the other two stars in the Great Square in Pegasus, and the stars Beta and Gamma Andromedae, they form a crude kind of dipper far exceeding in size the Big Dipper now lying close to the northern horizon. The Great Square in Pegasus covers an area of approximately 200 square degrees. Within this enormous sky enclosure there is a singular dearth of bright stars. There are only two stars as bright as even the fourth magnitude, and scarcely two score of faint fifth and sixth magnitude stars within it and visible to those observing with the naked eye.



ANDROMEDA AND PEGASUS ARE VISIBLE IN THE OCTOBER EVENING SKIES

Beta Pegasi is a giant red star, though inferior in size to the super-giants, Antares, Mira or Omicron Ceti, and Betelgeuze. Its distance from the earth is about 200 light years. Its diameter, measured with the interferometer, has been found to be approximately 35,000,000 miles. It is one of the coolest stars with a surface temperature of only about 5000 degrees Fahrenheit.

In the constellation of Andromeda is located one of the most remarkable and beautiful objects in the heavens, the Great Andromeda Nebula, nearest, largest and brightest of that large class of objects known as spiral nebulae or "island universes." Its position is indicated on the diagram and it is visible even to the naked eye as a hazy patch of light. Photographs taken with powerful telescopes reveal a wealth of detail in this object and show it to be an enormous flat spiral in form. The central portion is much brighter than the outlying portions, which are intermingled with streaks and lines of dark nebulosity. The bright outer nebular portions break up, when photographed with the most powerful telescopes, into countless star-like points reminding one of the great star-clouds of the Milky Way. Large numbers of Novae have been found in the Great Nebula. They have appeared chiefly in the central regions of unresolved nebulosity. The appearance of certain types of variable stars, known as Cepheids, in this and other spirals has yielded a method for determining their distances. From a study of these stars found in the Great Andromeda Nebula it has been found that it lies at the inconceivably great distance of about 870,000 light years. Yet it is the nearest of the spiral nebulae, many of which are known to be fully a hundred times more distant! With long exposures the Andromeda Nebula is found to have an extent of three degrees, which corresponds to approximately 50,000 light years in diameter. Its real luminosity, it has been estimated, amounts to about one and a half billion times that of the sun. Its period of rotation comes out about 17,000,000 years, and the mass of the central brighter portion is about 270,000,000 times that of the sun. Yet for all of its enormous dimensions and inconceivably great mass and luminosity the Great Andromeda Nebula is scarcely to be compared in size with our own Galaxy which, if the estimates are correct, is several times as great in diameter. There is evidence that there exists in the Great Nebula in Andromeda a brilliant, central region such as there is no reason to believe exists in our own Galaxy, and the stars in that remarkable island universe must be far more densely crowded together than they are in the Galaxy. Unlike most of the spirals, which are known to be receding from us at high velocity, the Great Andromeda Nebula is approaching us at the rate of 200 miles per second.

A small oval companion nebula to the Great Nebula lies directly above its center and another nebula lies directly below it. Telescopically most of the spiral nebulae are disappointing objects, faint and hazy and lacking in detail when viewed directly, but long exposures with powerful telescopes reveal a wealth of detail and remarkable varieties of form and structure in these mysterious objects of enormous size lying far exterior to our galactic system.

The star Gamma Andromedae, or Almach, is, for those who have small telescopes, a magnificent object to observe. It is a double star of beautifully contrasting colors of orange and blue. The companion star is itself a close double star.

This is an excellent time to view the planet Saturn. Even a small 2½-inch telescope will show the Rings of Saturn. The planet is now in Capricornus, close to the third magnitude star Delta Capricorni. It may be seen in the southeast at sunset and is visible most of the night. It is yellowish in color and is now equal to Altair in brightness.

Jupiter comes into conjunction with the sun on October 27 and will be visible only for a short time early in the month close to the western horizon.

Mercury is an evening star this month and reaches its greatest elongation east of the sun on October 10. It is so far over in the southwest that it will be difficult to observe, but may be seen within a few days of elongation, in the evening twilight. Mars is now a fine morning star rising about four hours before the sun. Venus is still in the morning sky, but is now too close to the sun to be seen.

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Beauty in the Beast

By GEORGE ELWOOD JENKS

Did you ever hear the fairy story of Beauty and the Beast? The story of the man who was called the Beast because his face and body were so ugly that he was feared and hated by everyone—everyone except the beautiful Princess? But she was wiser than all the others and could see the good heart under the homely face and twisted body.

And so her love broke the evil spell, and instantly everyone could see that the Beast was not a beast at all, but a handsome young Prince!

Do you know that all Nature is full of stories of Beauty and the Beast? All we have to do is to learn to see them. It is not easy at first because we are in the habit of thinking that the pretty creatures are good, and the ugly things are bad.

But very often this is not true. Just as likely as not the very ugliest creatures are most interesting and are really lovable when we get to know them.

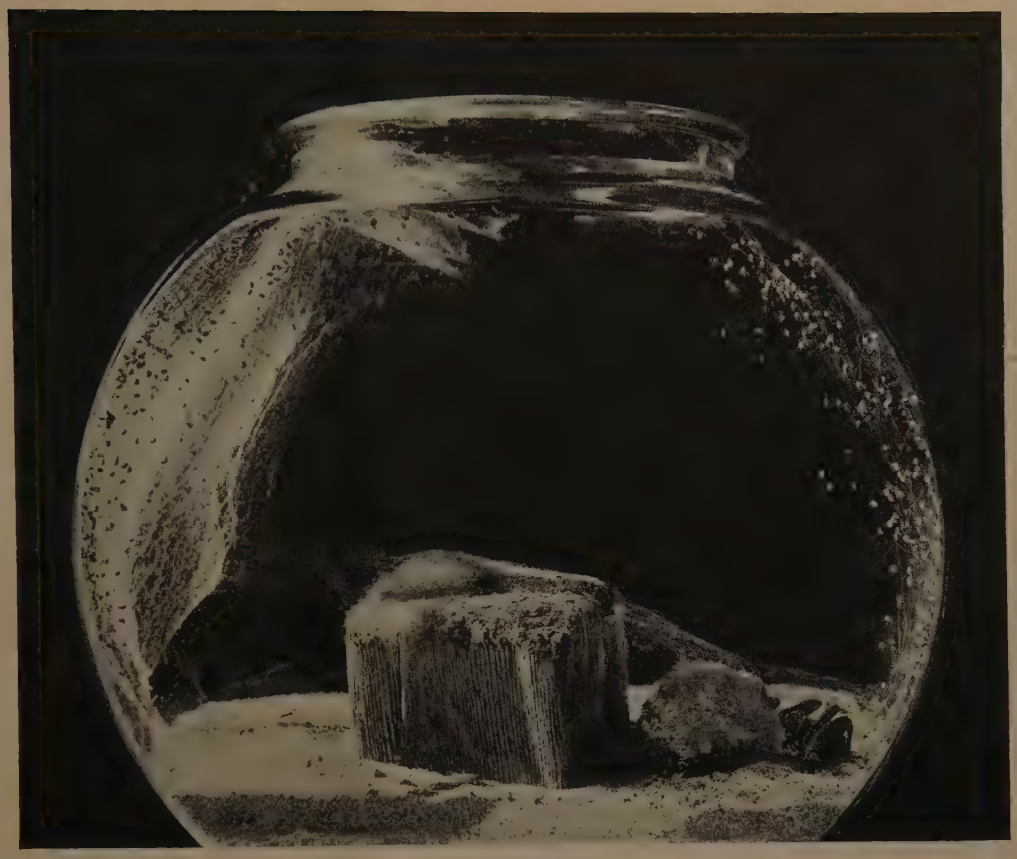
So it is with spiders. Most people fear and hate them just because they LOOK so hideous. But there is really only one kind of a spider that you need to be afraid of. That is the Black Widow, the smooth, shiny black spider with the bright red spots on its stomach. Keep away from this kind! It bites, and the bite is ten times more poisonous than a bee's sting.

But no other spider is dangerous. Don't try to handle any kind of a spider. Some kinds bite hard enough to hurt. So learn to watch them and see what interesting things they do—besides spinning pretty webs and catching flies. This is the story of a brave little spider mother that stayed on guard beside her eggs until the babies came out—long after she was dead! The best word here is devotion.

MOMMIE SPIDER CLUNG CLOSELY TO THE SAC WITH HER EGGS TO PROTECT THEM

It was late in the fall and a drizzly rain was falling when Daddy found her. She was a little black garden spider, and she was clinging close to her woolly egg-sac high up on a back-yard clothes-pole. He was a Nature lover and a photographer, so he took them down very carefully and carried them home to see what would happen. Little Danny was quite excited when he saw them. He was only two years old then, but he had a great big curiosity about all the little creatures that Daddy brought home for his "Insect Zoo". So Danny learned that this was a "Mommie spidie" and that the white cluster in the middle of the woolly bundle was full of eggs that would hatch out into tiny baby spiders when spring came.

He watched breathlessly as Daddy hung the woolly egg-sac over the corner of a wooden block, so that he could take a picture of it. But did the little mother spider try to run away? No! She was going to make sure that no harm came to her



IN THE GLASS HOUSE SHE LAID MORE EGGS AND THEN NEVER LEFT THEM AGAIN

babies-to-be. She just hugged all the closer to the woolly bundle—just as you see her in the picture! Of course she was afraid, but she was too brave to run away and leave her babies in danger.

Then Daddy fixed them up a nice home in a glass jar. He caught flies and other insects, but the little mother didn't seem to be hungry. In a few days she laid some more eggs and put them in another warm, woolly sac. (This is the small sac on the top of the block in the picture.)

Many kinds of spiders make only a plain egg-sac that looks like yellow paper, but it seemed that this little mother wasn't satisfied with such a sac. She covered the eggs all around with a thick layer of coarse silk that looks like the fuzz on a winter bed-blanket, just as you see it in the picture.

Maybe she couldn't THINK it all out and know that the eggs must be kept warm all through the cold winter. Probably it was just the Voice of Instinct that seems to whisper to all wild things so that they know just what to do, but, anyway, she couldn't have made a warmer, snugger little nest for them.

After that the little Spider Mommie grew more and more quiet. Perhaps she was sick, or just growing old. Anyway she wouldn't eat a bite. She just stayed close to her babies-to-be and seemed to sleep most of the time. And at last, early in December, she went to sleep and never woke up.

"Mommie Spidie all-l-l-l gone!" said little Danny. Yes, the brave little mother-spirit had gone on—somewhere. But the ugly little body-house it had lived in just stayed right there, as if still watching over the babies-to-be.

And at last, one sunny day in early spring, the baby "spiderlings" came swarming out of the woolly sac.

"Poor 'ittle spidies haven't got ANY-Y-Y Mommie!" said little Danny.

But they didn't seem to mind. Of course they did not know how tenderly their mother had cared for them while they were so helpless in the egg-sac. And they did not know that sometime, after they had grown up, the magic Voice would whisper to them and teach them just how to care for their own eggs and the babies they would not live to see.

So they just hurried to spin their silky fairy ladders, and climbed to the top of their glass house. There they spun more silky ropes and scurried away, to explore the wide world and grow up into ugly-looking black spiders, but with brave hearts filled with tender mother-love.

And this is only one of the many true fairy stories that you can find all around you—stories of the Beauty of heart under the ugly shell of the Beast! And true fairy stories make all the world a Fairyland.

Hiking and Camping Forum

Conducted by
Ernest A. Dench

Inquiries concerning the fields embraced by this department will be answered by mail if a stamped addressed envelope is enclosed. Address the department editor.

Brevities

Latest aid to camping comfort is a sleeping bag with a canopy attachment at the head. Four sides are of mosquito netting, and top of waterproof cloth. Entire canopy can be of latter material, if desired, with ample ventilation. . . . We rather like the name of the Roamer Hiking Club, which operates in Southern California. . . . Carolina Mountain Club's current schedule calls for two monthly trips—one long, one short. Also a monthly social meeting in Asheville. . . . *Life Hikes* is the clever way in which Editor Thecla Wachtel captions marriages among members of the Wisconsin Go-Hiking Club. May the trips never tire the participants! . . . "Secretary must be notified beforehand by those wishing to partake of meals marked with an asterisk," is the unconscious humor in a British club program. . . . A new use for skis is advanced by Dr. Walter White Fife in the *Louisiana Conservation Review*. He claims they afford the only safe way to penetrate the marsh and boggy hinterlands on foot. The department editor specializes on jumping tournaments among tufts of hummock grass and matted rhododendron roots with an ordinary pair of hiking boots. . . . Hikers wishing full information on the Appalachian Trail in Connecticut are referred to two recent publications of the Connecticut Forest and Park Association, 215 Church St., New Haven. Combination of map and pamphlet sells for a quarter. . . . Goal of the Adirondack Mountain Club is 1000 members by October 1. Members are conducting personal solicitation among interested friends. . . . Publication is due any day now of the first edition of the Adirondack Guide Book. Seventy-five cents remitted to the Adirondack Mountain Club, Box 59, Capitol Station, Albany, N. Y., will secure a copy. . . . A new arrival is the Maryland Appalachian Trail Club recently given a start in Hagerstown. Although organized hiking is new to this Maryland city, some thirty residents have joined. The guest fee encourages visitors to apply for membership immediately on qualifying. Trips are made by chartered bus. Herbert Robertson is president. . . . *Along the A-T in Maryland* is an eight-page pamphlet with the imprint of the Potomac A-T Club, 609 American Security Bldg., Washington, D. C. A good dime's worth for anyone wishing to duplicate H. C. Anderson's three-day hike on South Mountain. . . . Potomac A-T Club has a new bronze insignia in preparation for members. . . . Annual get-together of the Western Federation of Outdoor Clubs was held Labor Day week-end at Snoqualmie lodge of the Spokane Mountaineers.

Restrictions Removed

Campers and tourists entering Canada are no longer required to leave a deposit on their equipment with customs officials. For full details, consult *How to Enter Canada* leaflet, free from National Parks of Canada, Ottawa.

An illustrated booklet of 64 pages, available without cost from the same source, is on *Canoe Trips in Canada*. May come in handy for next year's vacation, if too late now. Light weight and compactness are stressed in the chapter on a canoe cruise outfit. The ideal outfit is usually evolved by eliminating both duplicate and non-essential articles. Lists are given in the book.

Clubhouses on Wheels

Which will be the first club to invest in a mobile home? Some of these stationary clubhouses represent substantial investments. From a trail activity standpoint, a permanent base has proved detrimental to more than one hiking or mountaineering club. Usually a full-fledged clubhouse attracts a new type of member—more interested in indoor social diversions than in outdoor activities. There are clashing desires to be met.

Were the same amount of money applied to the purchase of mobile units, a club could expand in the right direction. Trips would have more variety and comforts. We refer, specifically, to makeshift transportation and commissary arrangements on overnight treks. Their success or failure often hinges on the unselfish sacrifices of car-owning members.

We have been browsing among the fascinating literature of the trailer and caravan makers. A club might, to begin with, acquire a vehicle as an experiment, hire a professional chauffeur for it by the day. Add to the fleet as the experiment proves its worth.

A wide range of expeditions is possible with flexible headquarters. A trailer or caravan combines transportation, commissary and shelter for a limited number. Upkeep and depreciation have to be allowed for, but they are likewise identified with clubhouses.

Exempted from these editorial comments are trail huts and shelters maintained at convenient distances apart on mountain slopes. They have long been welcome havens to hikers, and their usefulness will increase as civilized encroachments reach out elsewhere.

Canine Tramping Companion

Joan Begbie's book, *Walking in the New Forest*, is recommended only if you enjoy taking a dog out on a woodland tramp. Other readers will be annoyed at having scenic descriptions interrupted with a rabbit chase or a militant reception of forest keepers. The English region dealt with in the book is a hundred square miles in southwest Hampshire. Here one of the Norman Kings was killed hunting with a bow and arrow. The present forest, slightly more than one hundred years old, is mostly oak and pine. In her informal narrative Miss Begbie mentions learning to trust only the boldest tracks; the rest start promisingly and wind up in a bog. Vipers are supposed to be plentiful on one ridge, although the author never encountered any. There are some beautiful photographs in the book, published at $2.50 by the Macmillan Company.

Book of Major Climbs

Early ascents of principal peaks in the Alps, Himalayas and Japan are vividly described by a pioneer, Dudley Leavitt Pickman, in his book *Some Mountain Views*. The skimpy amount of text is atoned for by the generous number of full-page photographs. In the chapter on "Names of Mountains," Pickman deplores the substitution of prosaic names for the more colorful local titles, such as Everest for Gorishanta. The volume sells for two dollars, and is published by G. C. Manthorne and Company.

Organized Canoeing

The outdoor activities—week-end trips—of the British Canoe Association extend from April to September. Indoor events serve to round out the club year. There are Southern and Northern groups, with local clubs contemplated in other parts of the British Isles. Canoe camping is the most popular feature on the association's program.

The Pacific Trail

The San Antonio Club, whose slogan is "Out of Doors in California," has had the same president for fifteen years. He is Will H. Thrall, a veteran hiker. During the past year Thrall has been trail scout for the Los Angeles County Department of Recreation. One-third of his time has been devoted to furnishing information to local hikers and reporting on needed repairs on trails and camp grounds. Mr. Thrall is credited with laying out the 140 miles of the Southern extension of the Pacific Trail, which is to the West what the Appalachian Trail is to the East. This Alhambra, Cal., club specializes in week-end camping trips. One is scheduled virtually every month. Membership is confined to men.

"Box Car" Camping Trip

During August the Prairie Club of Chicago conducted a unique camping trip to Sault Ste. Marie, Ontario. The Algoma Central Railway provided several cabooses and box cars, which were hitched to the regular train serving this thinly-populated region. These Prairie Club cars were parked on sidings at attractive spots where the party could spend several days exploring the picturesque Montreal River, with its spectacular waterfalls and rugged highlands. By prearrangement the cars were picked up by a through train and taken to the next halt.

The party slept in tents on a bluff overlooking the river, and convenient to the railroad spur. One of the box cars, with the aid of lumber and a camp stove, was converted into a combined kitchen and mess room. Substantial meals were served by expert local cooks engaged by the club. The other cars were used for personal belongings. They also proved delightful rainy day retreats, where members passed the time reading, writing, loafing and conversing. Each participating member paid ninety dollars for the novel three-weeks' vacation.

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Rain has fallen *only* on days when the department editor could not take to the trail, so the claims of this waterproof cape have yet to be substantiated. Possibly by the time this is printed the evidence will be available. A balloon silk suit gave him fairly good service, while its satisfactory successor was a light-weight rubberized cape. An honest report on all three garments furnished for a stamped, addressed envelope.

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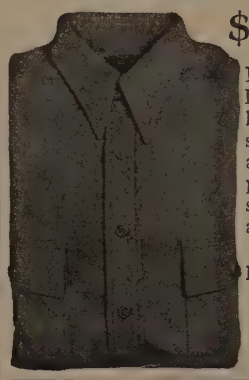

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Cats and Birds

When we decided to publish Mildred Garner's article on Cats vs. Birds in August we anticipated both commendation and condemnation. We have received six letters, four enthusiastically approving the article, two emphatically condemning it and us. One of these last was anonymous. Below we print comments, in part. Space does not permit use of the entire long letters.

Editor,
NATURE MAGAZINE:

I should like to voice approval of the article entitled "They're Getting Our Birds," published in the August issue of your magazine. This is a subject on which the public needs to be educated if we are to have any birds left for future generations. The rapidity with which cats breed and the appalling toll they take from the number of our birds, make those of us who understand the situation wonder just how there are any of our feathered friends left even now. . . . I wish that the article had added that the principle of the simple rabbit box will work equally as well as the cat trap if it is arranged so that the bait is attached to the trigger, and the trigger set to be pulled forward instead of pushed.

I also think Miss Garner is underestimating the kill of each cat. The average is fifty, as she said, but that would make each pet cat destroy about fifty and each stray several hundred. As Mr. Chester Reed says: "If a dog is caught killing a sheep, he is killed and the owner pays the damages; if a man is caught shooting a protected bird he is fined; but cats are allowed to roam without restriction, leaving death and destruction in their wake." I certainly think that cat owners should be forced to keep their pets closely confined. Belling them might keep them from stalking fully-grown birds, but it would have absolutely no effect on the killing of fledglings and that is where most damage is done.

E. R. P.

Editor,
NATURE MAGAZINE:

Since reading this article I have made inquiry among some of my friends who have cats that run loose. None of the cats climb trees and that is where a bird usually builds its nest, so that the "bird guarding its nest" is practically free from prowling cats at night or in the daytime. A friend of mine owns a cat 16 years old. He lives in the house only in the winter. All during the spring, summer and fall he lives in her yard, which is a good big one with many trees and many birds. She says he has never been in a tree; that he does catch a few birds, possibly five or six during the season. When a cat catches a bird and kills it, he always leaves the tell-tale feather sign. This woman and her husband work in their yard every day and would quickly see any signs of promiscuous bird-catching.

In the same issue of your magazine even the deadly mamba is given a break, Dr. Rose attempting to disprove the popular belief that this venomous snake is ferocious. All my life I have heard terrible stories about this snake. I almost had the idea that it deliberately hunted human beings. Such is the result of ignorance and false education. The attitude of NATURE MAGAZINE regarding the harmless domestic cat is practically the same. Mentally, so far as facts and figures regarding this maligned animal are concerned, you are living in the Dark Ages.

E. B. T.

Editor,
NATURE MAGAZINE:

Mildred Garner's article in your August number is excellent and timely, but it doesn't solve the problem of at least one of our readers. When the bird-killing cat is the handsome, well-fed Persian of a worthy and quite friendly neighbor, what then?

H. P. C.

Editor,
NATURE MAGAZINE:

Your article on cats in the August issue is a step in the right direction, let us have more of it.

If our best magazines and newspapers would give more attention to this subject and get the people to thinking what a menace the cats, vagrant and otherwise, are to our song birds, they might be aroused to do something to save the birds from extinction. Of ten nests on my place this year, nine have been robbed by cats, the young and sometimes the mother being devoured.

Will nothing be done while year after year the cats increase and the song birds diminish, till they share the fate of the heath hen, once so numerous? The last of the dying race was last seen March 11, 1932.

I could write on and on, on this subject, but I know you haven't time to read it, but hope you can find time to answer this letter.

I have been a subscriber to your magazine since it started, and it is eagerly looked for and read each month, but this article on cats is the best thing I have ever read in it.

G. W. D.

Editor,
NATURE MAGAZINE:

Where Tiny came from is not exactly a mystery, especially after reading the enlightening article by Mildred Garner in the August NATURE MAGAZINE. But his origin is unknown. Just all of a sudden, there he was.

When he dropped onto our doorstep, ragged, hungry, and deformed from the ravages of undernourishment and intestinal worms, we took him in and fed him entirely out of pity, and not because of any aesthetic charm he had. In fact his qualifications were quite the antithesis of charm. We washed our hands with squeamish thoroughness after handling the little creature, and relegated him to a very back corner of the house.

Our intentions were to comfort him with warm food while he lived, and then if his ailments did not yield to treatment, to have him mercifully put to sleep. That would have been much better than to have left the little animal to the mercy of stray dogs, hunger and improper food, sickness, and possible cruel torture under an automobile wheel.

You can guess what happened. He proved to be such a nice little fellow, so game, with lots of personality (there is individuality even among cats, you know), very clean in his habits, and endeared to us by the very fact that we had taken care of him. It was keeps.

With the proper medicines we treated him externally and internally for the parasites that afflicted him, being very exact in following the directions given. (One must be careful in administering vermicides to little kittens. The correct medicine costs a little more, and is a special preparation for young kittens, and not the same as that sold for dogs and full grown cats. Too large a dose is disastrous. Most vermicides are to be given on an empty stomach and not to be followed by food. This is necessary for several reasons, one of them being that the combination will form a poison which may result in the death of the animal—and there are several ways of killing it more humane than that.)

For the first two weeks that we had him Tiny was so weak and out of shape and yet so happy and obviously grateful for the treatment he was receiving, that his gameness triumphed over his misery, as did our admiration for him over our pity. I was prompted to think about writing an article on stray cats and control of the same. I was going to take a picture of Tiny as he stood looking up at Laura. That picture would have shown how abnormally small the little creature was, how misshapen, and yet how responsive he was to human attention. I had seen him stand, looking up that way almost seeming to talk, time and time again. It would have been a picture fraught with so much story.

Again you can guess what happened. Before I knew it, five or six weeks had galloped by, and Tiny was a normal kitten with a normal size and shape, and he didn't look a bit different in a picture than any other kitten. Of course to us he is different. I still believe he has more than the average amount of personality, although that is only the discovery every lover of pets makes about his particular pet.

In the meantime my copy of the August NATURE MAGAZINE arrived, and there was Miss Garner's article, much better and more powerful with facts and figures than mine would have been. It brought out in a very impressive manner the necessity for control of the stray cat. Although that was what I had in mind, I probably would have stressed more the humane side with respect to the cat in addition to the other aspect. So I have written this short "addendum."

We humans are responsible in a large measure for the cat situation. As Miss Garner brought out, it is an unnatural state of affairs when so many animals of one species are allowed to multiply unmolested, and to roam as hunters never hunted.

It is not at all unkind to kill off the strays in the humane manner suggested in her article. In fact it is positively inhumane to turn loose a batch of kittens instead of killing them.

Driving one evening, we passed a dairy. Now some people have the notion that if they dump their cats off at a dairy, the cats will be provided for. Poor dairies! Poor cats! Also poor birds and little children.

Somebody had carried out their notion that evening by dumping two little kittens in the road in front of the dairy. At the sight of them I found my eyes full of tears—and I don't cry easily. One kitten lay dead in the road, struck by an automobile. The living one sat beside its little dead brother in pitiful bewilderment. It didn't know what else to do.

Of course we know that innocent little kittens will soon grow into cats, perhaps marauding strays to menace bird life, to carry diseases, and to serve as a detriment in the world in many ways. Still my heart is tender for every hungry little kitty I see. As we came through town yesterday evening about dusk, I saw a white kitten outside a store building, savagely gnawing a

something it had salvaged out of the trash cans. It looked so little. It was working so hard to get a small bit of nourishment out of the refuse. It wasn't complaining, only clinging tenaciously to what life it had, and trying to satisfy the torment of hunger. I thought of Miss Garner's article again, and applauded it mentally, and hoped that many others would read it and really take it upon themselves to do their share in keeping down the number of cats, *so that what cats there were would have homes and care.*

I am sure no one will ever enter the gates of heaven who, having found himself with a bunch of kittens on his hands, instead of disposing of them humanely, is guilty of having dumped them out into the world, even though it was in front of a dairy or a feed store.

GRACE A. SHULTS.

P.S. We have changed Tiny's name. We call him Frisky now. And if you don't think he deserves the title, you ought to try running this typewriter with him all over it.

YOU CAN GROW LILIES

(Continued from page 181)

was a retarding factor. At any rate, this splendid class of flowering plants was tardy in being accorded the important place in horticulture it deserves.

The cultivation of most lilies is not difficult. True, there are peculiarities of soil and location to be observed, certain special needs of individuals that must be complied with to assure success, but such is equally true of most plant families.

The first and most important requisite of all lilies is thorough drainage. Even such species as grow along streams and damp meadows are found to be situated on hummocks or small mounds where the bulbs are held above the water, although their roots may penetrate to and into it. Provide ample drainage, then, for whatever lilies you plant. If the bed is not naturally well drained, make it so by a generous substratum of gravel or coal ashes. It is a good plan to raise lilies in beds which have a gentle natural or artificial slope which effectually prevents the collection of any pools of water either in summer or winter.

It is advisable to surround each bulb, as it is planted, with several inches of clean, sharp sand. This procedure provides additional drainage as well as a prophylaxis against the invasion of worms and injurious insects through the surrounding soil.

The proper chemical composition of the soil in which lilies are to be grown—whether acid or alkaline—has been thoroughly discussed and warmly argued over for years. It has been determined that some lilies despise soil in which lime is present while others revel in it. Lily seedlings prefer a soil of slightly acid nature. The safest bed to use for all lilies is one which is neutral or slightly on the acid side.

The proper depth at which to plant various bulbs is dependent upon two things—the size of the bulb and whether it is of a stem-rooting or base-rooting species.

Base-rooting lilies produce roots from the base of the bulb only, while stem-rooting lilies project clusters of roots from the stem above the bulb as well as below it. These stem roots are important to the welfare of the plant and may be easily injured. Care must be taken, therefore, to plant such

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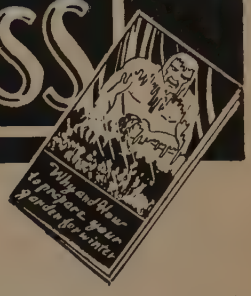

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bulbs at a depth which will allow ample space between the top of the bulb and the surface of the ground. A safe rule to follow is to plant all lily bulbs at a distance below the surface of the soil which equals three times the height of the particular bulb. *Lilium candidum, testaceum* and *giganteum* are exceptions to this rule and should never be covered with more than two inches of soil.

Ground cover is an important consideration in the planting of lilies. They love sun, yet their roots and the lower section of the stem should be shaded. Low-growing shrubs or any of the shorter annuals and perennials, whose root action is not too deep or spreading, may be used. A two-inch mulch of peat moss is also effective if, for any reason, it is not practical to use vegetation.

The shock of transplanting lily bulbs is apt to result in several of the species making little or no growth the first season after planting. They remain dormant for a year while their root system recovers, yet usually grow strongly the second year. *Lilium pardalinum, monadelphum* and *martagon* sometimes act in this manner.

All species of lilies welcome fall planting, although many of them may be successfully planted in the spring, such as: *L. auratum, croceum, davidi, davuricum, elegans, hansoni, henryi, regale, sargentiae, speciosum, tigrinum* and *umbellatum.*

Plant some of these glorious flowers—hundreds of them if you have the room. Plant those species which are most likely to succeed in your latitude but try a few of the more difficult ones as well. And, as an admonition, purchase only sound, healthy bulbs from reputable sources.

Ousting Caterpillars

Cooperative mass endeavor can accomplish much in ridding a locality of a troublesome insect pest, as it did this year in North Haledon, New Jersey. Under the leadership of Herman Gionti, the children of the Memorial School accounted for more than five thousand tent caterpillar nests during a concerted and intensive drive. Thus they saved innumerable shrubs and trees and effectively checked the spread of this pest. At the same time they acquired insect knowledge. There are great possibilities in such activity under proper leadership. It has been done successfully when an infestation of bag worms has been found. It is most effective to introduce the competitive factor and to keep scores of accomplishment by individuals and groups. Local governments could well afford to provide modest prizes for such splendid work.

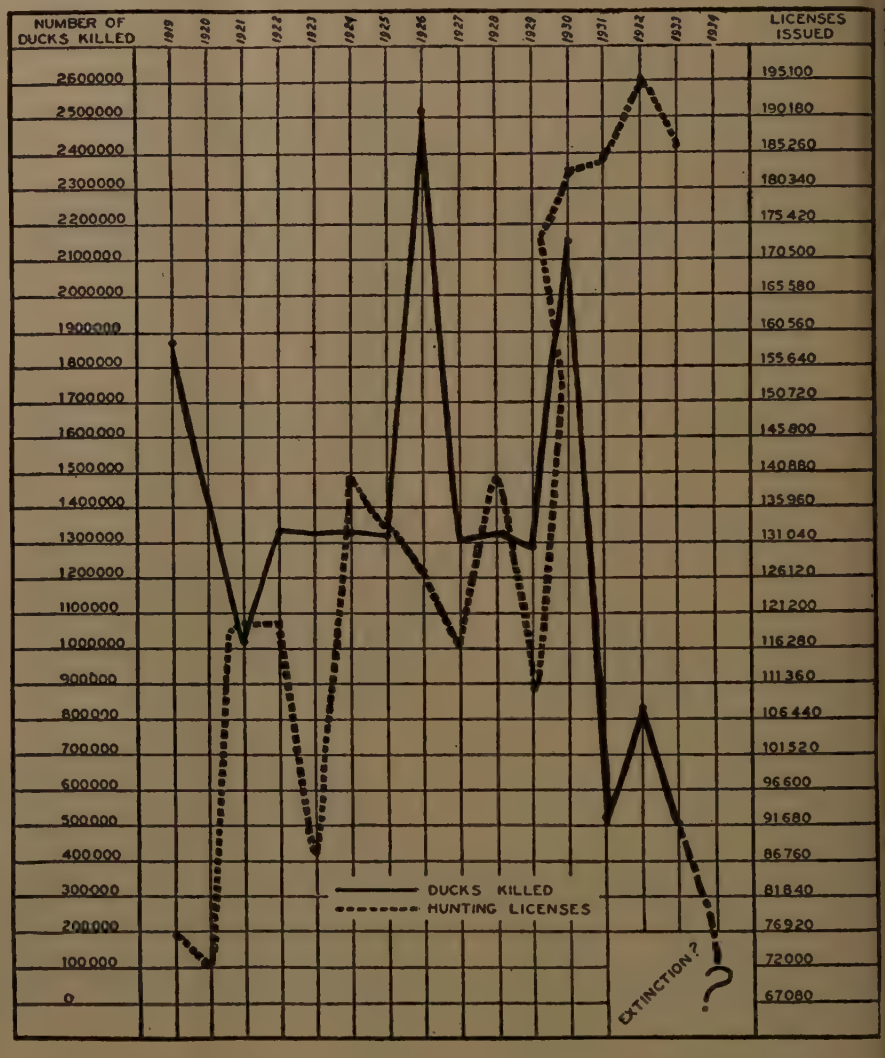
Audubon Year Book

We are always delighted to receive for notice the year-book of the Indiana Audubon Society because it testifies to the successful activity of that organization and contains much of interest. Through this annual one obtains a summary of the progress of bird conservation in Indiana, notes on distribution and increases or decreases and other interesting and permanently valuable ornithological material. In this issue there is a splendid and deserved tribute to Alden H. Hadley of the National Association of Audubon Societies. Copies of the year book are available from Miss Margaret R. Knox, 4030 Park Avenue, Indianapolis, Indiana, for one dollar.

A Picture of Vanishing Waterfowl

Despite the fact that the shooting regulations referred to on our editorial page are what many conservationists regard as the most destructive ever faced by our waterfowl, they have been adopted by the Secretary of Agriculture and approved by the President. However, there still remains the probability that a number of the mid-western states will close the season. A determined campaign to this end has been waged by Dr. W. T. Hornaday of the Permanent Wild Life Fund, assisted by many far-sighted and able conservationists. Among those prominent in building up constructive sentiment in the drought-stricken states, where the alarming conditions of waterfowl scarcity are most evident, is Cyril W. Plattes, acting secretary of the Minnesota Game Protective League.

We are glad to be able to reprint here the graph from the *St. Paul Pioneer Press* which paints a convincing picture of Minnesota conditions. Had all the states kept data as complete as those of Minnesota, the dangerous situation here depicted would be shown to be continental.



The seriousness of the duck situation in Minnesota is pictured herewith. The graph was made by Clifford R. Sakry of St. Cloud, conservationist, newspaper man and statistical recorder of the Minnesota Game Protective League, from figures on waterfowl hunting kept by the State Department of Conservation. It shows how waterfowl have decreased in the past four years to a point where virtual extinction is imminent while duck hunters have multiplied enormously. In the past four years duck hunters increased more than 50 per cent while ducks decreased about 75 per cent. The low bag total of 1931 is in part accounted for by the national 30-day season that year, but in 1932 the kill advanced only slightly in a 60-day season. In 1933 there was another 60-day season and the kill recorded an all-time low.

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Probably your family and friends have clucked sympathetically behind your back, saying that you are one obsessed with a dream that can never come true. You may have set dates that were deferred again and again. The depression, the marriage of your oldest daughter, an unexpected financial setback may have depleted the money you have saved toward that adventure-fraught voyage. But you have held steadfast to your dreams, and such devotion and determination will not forever brook denial.

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NO CLOSED SEASON

(Continued from page 159)

roadside marshes, in the woods and fields of even so thickly congested areas as the suburbs of Chicago. I had had occasion to help my friend, S. C. Cutting, with his motion picture work when we were together in Abyssinia, and he carried a little hand movie as an accessory to his large Akeley. As all travel in Abyssinia is by pack animals, it is impossible, of course, to unload a mule and set up a camera for every pleasing vista, so Cutting was in the habit of carrying his Eyemo in his saddlebags. Many interesting shots were secured which otherwise would have been lost.

When we were gathering our equipment for the taking of motion film of birds and mammals for the film library of the Chicago Academy of Sciences, I remembered the ease with which Cutting made photographs with his hand camera, and I secured one to use as an accessory with our heavier outfits. After lugging around heavy tripods and cameras in waist-deep water and knee-deep mud for hours at a time, one gradually discards the heavy equipment and relies on the lighter machine.

So we have made many thousands of feet of birds and mammals for use in lectures in the public schools. We endeavored to portray the lives of local birds which are abundant, but little known because of their secretive habits. We desired to pry into their family secrets and make a permanent record for the present and future generations.

It is not difficult to photograph a nesting bird, for the old one is solicitous of her eggs and young. She will return quickly after the photographer has concealed himself in the blind. Suppose we are photographing a marsh bird such as the Virginia rail, a common species throughout the northern states. The blind is erected in the water near the nest, and is decorated with tules and marsh grasses; the camera is set up and carefully focused, and all vegetation is tied aside to give a clear view of the eggs or young. There is an anxious clucking sound as the rail circles about through the dense stand of vegetation, and occasionally the harsh notes give way to pleading calls. We stand knee-deep in water, and ankle-deep in mud, and wish that we had had the intelligence to bring a box to sit on. Deer flies take three-cornered hunks out of exposed portions of our anatomy, and mosquitos keep up what is to them, probably, a cheerful hum. Then the voice in the reeds is still. Overhead a few darting red-wings hurl invectives at our blind, but the rail is quiet as she cautiously explores the vicinity of her nest.

In a few minutes, possibly (or two hours), we see the parent bird returning to her nest, a slender brown shadow as it moves quietly through the tangled growths. Our victim has returned to her nest, and as she comes within range of our view finder, the camera starts its work. At the first whir the rail jumps aside, but immediately returns and pays no further attention, for the continuous, rhythmic sound does not startle her as would an abrupt snapping of a twig. She pokes her beak among her eggs, turns one or two around, and then, satisfied that all is well, she settles upon them and starts pulling the grass around her.

An old naturalist friend once told me that it was not necessary to go to Africa and Asia for lecture material. "A good observer can find material in his own back yard," was his remark. And after photographing birds near my home the past season, I believe I can truthfully say that I learned more about bird nature by using a camera than I ever did with a gun.

On Home Aquaria

Despite the fact that it is an activity of increasing popularity there are few worthwhile volumes devoted to the home aquarium. The latest addition to this literature bears the title *Life and Love in the Aquarium.* This is not a romance laid in the famous aquatic building in Battery Park, New York, nor yet a novel with a background of the Shedd Aquarium in Chicago. It is a handbook on the home aquarium; the fascinating, darting, vari-colored fishes that occupy it; the method of care of these fishes; the aquarium itself, and advice on equipment. This is the work of C. H. Peters. It is illustrated in color and black and white by Henry Uhlig. Following the general advisory chapters, the plan is to consider each species individually, describing it, pointing out any special requirements of its life, and otherwise presenting, in compact and practical fashion, all pertinent information about the fish. This volume will grace the library of any home aquarist and will be put to frequent use. It is sold by the Book Department, The Home Aquarium Bulletin, 60 South Maple Ave., East Orange, N. J. The price is $3.75 postpaid.

On Useful Plants

Economic Plants by Ernest Elwood Stanford is a reflection of a comparatively recent trend toward the organization on a college-grade basis of the study of the utilities of plants to man. While courses in botany from the economic point of view are not so frequently offered as are courses in plant physiology or pathology, there has been a marked increase of interest in this subject during the last ten years. Hence the demand for the present volume, which is based on many years of interest in and experience with economic plants on the part of the author. Dr. Stanford is Professor of Botany at the College of the Pacific. The arrangement of his chapters is interesting and the result comprehensive. After dealing generally with certain fundamentals of plant construction, the author proceeds to, first, the forest products, to which he devotes four chapters; then the textile plants; paper and pulp; cereal and allied crops; sugar plants; the fixed oils; fruits, spices and beverage-yielding plants, and medicinal plants. Thoroughly illustrated, this volume is a valuable textbook. It is published by D. Appleton-Century Company as one of the botanical volumes in the Century Biological Series, which is being brought out under the general editorship of Dr. Robert Hegner.

Tropical Fish

What certainly will be a popular little booklet is that entitled *Tropical Fish* by Lucille Quarry Mann brought out by the Leisure League of America, 30 Rockefeller Plaza, New York City. Mrs. Mann is the wife of Dr. William M. Mann, Director of the National Zoological Park. In this booklet she has presented in simple and practical text the fundamentals of tropical fish care and breeding with particular attention to some of the more common varieties best chosen by the beginner. She treats with the management of the aquarium, diet and disease and other essentials. The text is nicely illustrated by Garnet W. Jex. The booklet sells for twenty-five cents and it is a real quarter's worth.

A Healthy Orphan

Many readers will recall the striking and poignant picture printed in our issue of March of this year showing an orphaned fawn by the body of its mother, who had been shot by some thoughtless or vicious hunter. The fawn, although half starved, was taken to the Ogemaw Game Refuge of the State of Michigan and nursed back to health. Although one leg is shortened by buckshot from the gun of the hunter who killed the doe, the fawn is in splendid health and living a safe and contented existence.

Flock Joy

By Rae Robins

Potomac Park surrounding Washington Monument is a picturesque scene, facing the side of the Department of Commerce Building. On the benches on all sides of the park people sit reading, drowsing or idly watching the birds. On my way to business one morning I noticed an elderly woman in the centre of the park, with a large package under her arm, whistling and waving her hands. Stopping for a moment I noticed birds flying up to her from all sides—robins, blackbirds, pigeons. Squirrels also scampered up. She was calling them by name, "Patsy" and "Tootsie," "Sweetie" and "Tweetie," "Dicky" and "Micky," "Cutie" and "Tooty." It amazed me, and I stood there watching her as the birds lit on her shoulders, ran over her arms, in fact, covered her. As they came up to her she gave them peanuts from her hands.

"Look over there," she said. "There's a lame pigeon, with a broken wing and a ripped toe. He has been that way a long, long time. He gets around all right and knows me better than the rest. Watch him. Come on, Patsy," she said. "Don't let the other birds cheat you today. Here's your share." He wobbled along, stuck his head up at her, the other pigeons attempting to push him aside. She shooed them away and he stood there alone, taking his "royal" treat of peanuts. There was no cheating him with Mrs. O'Sullivan on hand.

It was fascinating to watch the tiny squirrels come up to her, stick their heads in the peanut bag to get their share. When I, as a stranger, attempted to hand them one, they wouldn't come close. They knew their Mrs. O'Sullivan and trusted her.

"Each week," said Mrs. O'Sullivan, "it is my pleasure to buy a ten-pound bag of peanuts, taking a package along each morning and feeding the birds before I go to business. By the way, what time is it now? I must be going along. I hear the nine o'clock gong."

It is truly "flock joy" for all birds in Potomac Park when Mrs. O'Sullivan gets around.

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